(1)

AD-A162 284

RICHARD B. RUSSELL

PREIMPOUNDMENT WATER QUALITY STUDY

JANUARY THROUGH JULY 1981

FINAL REPORT

20030117009

Water and Air Research, Inc.

CONSULTING ENVIRONMENTAL ENGINEERS AND SCIENTISTS

DISCLAIMER NOTICE

PD-XE

RICHARD B. RUSSELL

PREIMPOUNDMENT WATER QUALITY STUDY

JANUARY THROUGH JULY 1981

FINAL REPORT

Prepared For:

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract No. DACW21-81-C-0029

Prepared By:

WATER AND AIR RESEARCH, INC.
Gainesville, Florida

December 1981

WAR Project No. 7141

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) Richard B. Russell Preimpoundment Water Qaulity Study	5. TYPE OF REPORT & PERIOD COVERED Final
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s) DACW21-81-C-0029
9. PERFORMING ORGANIZATION NAME AND ADDRESS Water and Air Research, Inc. Gainesville, Florida	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer District, Savannah P. O. Box 889 Savannah, GA 31402-0889	12. REPORT DATE December 1981
	13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Georgia	Water quality
South Carolina	Sediments
Savannah River	Hydrology
Richard B. Russell Dam and Lake	Chemical Contamination

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document presents ~~the~~ results of the January through August 1981 Preimpoundment Water Quality Study ~~for~~ the Richard B. Russell Dam and Lake projects. The study area includes a 48-kilometer stretch of the Savannah River and its tributaries in Georgia and South Carolina between Hartwell Dam (at the northern end of the study area) and the Richard B. Russell Dam site near Calhoun Falls, South Carolina (at the southern end of the study area). Sampling for meteorological, hydrologicial, water and sediment quality, fish and invertebrate tissue contamination, and an inventory of the existing benthos and periphyton was con-

ducted at a total of 12 stations. Sampling and analytical methodologies followed standard procedures and detailed data results are included in attached appendice . Where appropriate, the data generated was submitted to the U.S. Environmental Protection Agency's (EPA) Data Storage and Retrieval (STORET) system.

In brief, the results of this study show that the water quality of the Savannah River and its tributaries within the study area is generally good. A comparison of the results to the EPA, Georgia, and South Carolina water quality criteria shows that detected levels for the water quality parameters measured were generally within acceptable levels unless due to natural causes. Concentratings of pesticides and PCBs in the sediments were below the detection levels in both February and July and metal concentrations in the sediments were not indicative of serious levels of contamination.

Diatoms accounted for the greatest percentage of all periphytic algal divisions present with most of the species characteristic of circumneutral-to-acidic water of low mineral content. Nineteen of the 73 diatom taxa found during this study are associated with eutrophication in lakes throughout the southeastern ~~United~~ States but generally were found in low cell densities. Benthic and Hester-Dendy macoinvertebrate assemblages were characteristic of pollution-free riverine environments.

Diversity and biomass values generally were lower in the Savannah River than in the tributaries.

The most significant sampling station (Station 11) with regard to potential postimpoundment water quality problems was located downstream of the Bigelow-Sanford Carpet Factory, where water quality was lower than in the other areas sampled.

Tissue results for metals, pesticides, and PCBs indicate elevated levels of PCB-Aroclor 1254 and metabolites of DDT in the Savannah River with the probable source upstream of the study area. Detectable levels of BHC, chlordane, heptachlor, and P'P' DDE were also found in tissue samples in two tributaries, but the low concentrations indicate the probable source to be agricultural runoff.

TABLE OF CONTENTS

TABLE OF CONTENTS

(Continued, Page 2 of 2)

LIST OF TABLES

LIST OF TABLES
(Continued, Page 2 of 2)

LIST OF FIGURES

LIST OF FIGURES
(Continued, Page 2 of 4)

LIST OF FIGURES
(Continued, Page 3 of 4)

LIST OF FIGURES
(Continued, Page 4 of 4)

ABSTRACT

ABSTRACT

This document presents the results of the January through August 1981 Preimpoundment Water Quality Study for the Richard B. Russell Dam and Lake projects. The study area includes a 48-kilometer stretch of the Savannah River and its tributaries in Georgia and South Carolina between Hartwell Dam (at the northern end of the study area) and the Richard B. Russell Dam site near Calhoun Falls, South Carolina (at the southern end of the study area). Sampling for meteorological, hydrological, water and sediment quality, fish and invertebrate tissue contamination, and an inventory of the existing benthos and periphyton was conducted at a total of 12 stations. Sampling and analytical methodologies followed standard procedures and detailed data results are included in attached appendices. Where appropriate, the data generated was submitted to the U.S. Environmental Protection Agency's (EPA) Data Storage and Retrieval (STORET) system.

In brief, the results of this study show that the water quality of the Savannah River and its tributaries within the study area is generally good. A comparison of the results to the EPA, Georgia, and South Carolina water quality criteria shows that detected levels for the water quality parameters measured were generally within acceptable levels unless due to natural causes. Concentrations of pesticides and PCBs in the sediments were below the detection levels in both February and July and metal concentrations in the sediments were not indicative of serious levels of contamination.

Diatoms accounted for the greatest percentage of all periphytic algal divisions present with most of the species characteristic of circumneutral-to-acidic water of low mineral content. Nineteen of the 73 diatom taxa found during this study are associated with eutrophication in lakes throughout the southeastern United States but generally were found in low cell densities. Benthic and Hester-Dendy macroinvertebrate assemblages were characteristic of pollution-free riverine environments.

Diversity and biomass values generally were lower in the Savannah River than in the tributaries.

The most significant sampling station (Station 11) with regard to potential postimpoundment water quality problems was located downstream of the Bigelow-Sanford Carpet Factory, where water quality was lower than in the other areas sampled. Is Bigelow-Sanford plant effluent in violation of S.C. State Water Quality Standards?

Tissue results for metals, pesticides, and PCBs indicate elevated levels of PCB-Aroclor 1254 and metabolites of DDT in the Savannah River with the probable source upstream of the study area. Detectable levels of BHC, chlordane, heptachlor, and P'P' DDE were also found in tissue samples in two tributaries, but the low concentrations indicate the probable source to be agricultural runoff.

OBJECTIVES

OBJECTIVES

The overall objectives of the Richard B. Russell Preimpoundment Water Quality Study were to:

1. Determine and document the preimpoundment water quality conditions within the future area of Lake Russell;
2. Collect data to serve as the basis for evaluating, over time, the water quality conditions which develop in Lake Russell;
3. Collect data to allow guidance for future reservoir control and management; and
4. Provide an adequate data base to facilitate U.S. Army Corps of Engineers (COE) Savannah District coordination with state agencies to implement watershed pollution control.

These objectives were met by taking samples for physical, chemical, and biological parameters in the Savannah River and its tributaries. The February 1981 (cold temperature, high-flow period) and July 1981 (warm temperature, low-flow period) samples were analyzed using standard analytical techniques and selected data generated was stored in the U.S. Environmental Protection Agency's (EPA) Data Storage and Retrieval (STORET) system.

INTRODUCTION

INTRODUCTION

Richard B. Russell Dam is located on the Savannah River at Mile 275; about 6.5 kilometers (km) southwest of Calhoun Falls, South Carolina and 26 km southeast of Elberton, Georgia (see Figure 1). It is the third multipurpose dam project built on the Savannah River by the U.S. Army Corps of Engineers (COE), and is located 48 km downstream from Hartwell Dam and 60 km upstream from Clark Hill Dam. The Richard B. Russell Dam will impound virtually all of the Savannah River between Hartwell Lake and Clark Hill Lake.

The Savannah River above Richard B. Russell Dam drains an area of approximately 7,500 square kilometers (km^2). Flow through the reach to be impounded by Russell Dam is presently governed by releases from Hartwell Dam during periods of peak power generation. These releases generally occur on weekday mornings and afternoons for periods of 4 to 5 hours and create rapid changes in flow, depth, temperature, dissolved oxygen, and other physical-chemical properties of the tailwater. Water is drawn through penstocks at a centerline depth of 32.6 meters in the hypolimnion of Hartwell Lake. During normal generating periods, the river flows nearly bank-full at an average velocity of 0.75 to 1.1 meters per second. The maximum generation release capacity of 216 cubic meters (m^3) per second results in a 1.5- to 2-meter rise in water level below the dam. Time of travel of the release wave from Hartwell Dam to Russell Dam is approximately 8 hours. Between generating periods, flow in the channel diminishes and the water level recedes, exposing large areas of the river bottom. Discharge from Hartwell Dam during nongeneration periods is approximately 0.8 m^3 per second (Kendall, 1981; Matter, et al., 1980).

Richard B. Russell Dam was authorized by U.S. Congress in 1966 for the purposes of hydropower generation, flood control, and recreation. Construction commenced in January 1976; the dam is scheduled for completion in early 1985. Power and spillway sections of the dam are

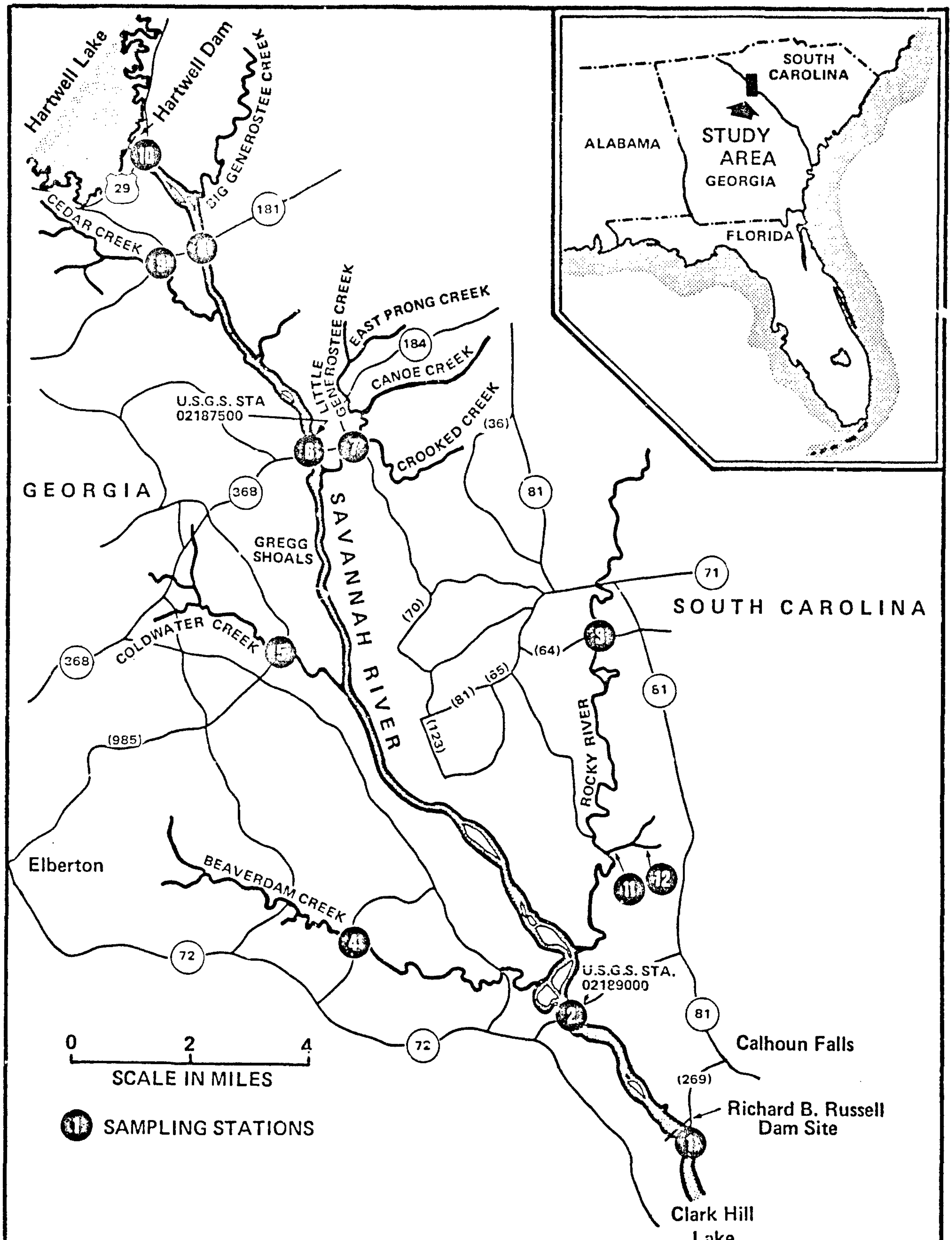

FIGURE 1. Richard B. Russell Preimpoundment Study - Sampling Station Location Map

concrete, with earth fill structures on each end. Concrete structures were scheduled for completion in June 1981. Reservoir filling is scheduled to begin in June 1983, with power generation beginning in November 1984 (COE, 1976).

The central concrete power and spillway section of the dam spans 1,400 meters, with a maximum height of 59.5 meters above the riverbed. Earth embankments on either side extend for a combined length of 1,400 meters. The top of the dam is at an elevation of 150.9 meters (495 feet) above mean sea level (msl). Elevation of the maximum power pool will be at 144.8 meters (475 feet) msl and the maximum flood control pool will be at 146.3 meters (480 feet) msl. Elevation of the spillway crest will be at 132.9 meters (436 feet) msl. Ten tainter gates will control flow through the spillway, each measuring 15.2 meters wide by 13. meters high. The power plant will have four turbines having a combined generating capacity of 300,000 kilowatts (kw). This capacity could be doubled if U.S. Congress approves installation of pumped storage turbines at the dam (COE, 1976).

A total of 10,785 hectares (26,650 acres) will be inundated by Lake Russell at maximum power pool elevation, corresponding to a storage volume of 1,230 km^2. At maximum flood control pool, 11,875 hectares (29,344 acres) will be inundated with a total storage capacity of 1,420 km^2. Additional land acquired for the project is determined by a 91.4-meter (300-foot) horizontal measurement, upland from Elevation 475, or a 148-meter (485-foot) msl vertical freeboard; whichever results in the larger area. The total area included by these criteria is 21,150 hectares (52,263 acres). An additional 2,833 hectares (7,000 acres) have been acquired for recreation and public access, resulting in a total project area of 29,983 hectares (59,260 acres). Of this total area, 50 percent lies within Elbert County, Georgia; 40 percent in Abbeville County, Georgia; 10 percent in Anderson County, South Carolina; and <1 percent in Hart County, Georgia (COE, 1974; Kendall, 1981).

METHODS AND TECHNIQUES

METHODS AND TECHNIQUES

Sampling Site Locations

Sampling site locations on the Savannah River and its tributaries were specified by the COE Savannah District. The sampling sites are shown in Figure 1 and their locations tabulated in Table 1. Station 11 was added to the original 10 stations because potential water quality problems were observed in the stream by COE personnel prior to the first field sampling period (John LeRoy, COE Savannah District, Personal Communication). During July, an additional station (Station 12) for water quality sampling only was added upstream of the influence of the Bigelow-Sanford Carpet Factory to determine background levels in the stream. Water depths given in Table 1 are for nongenerating periods in the Savannah River. Water discharged from Hartwell Dam raises the water level 1.0 to 2.0 meters as it passes down the river.

Sampling Schedule and Methodologies

A complete schedule including parameters sampled and sample replication is shown in Table 2 for the February and July 1981 sampling periods. Table 3 is a summary of the sampling methodologies (including respective maximum allowable holding times), sample container and preservation techniques, analytical procedures employed, and reported detection limits for the water quality parameters.

Field Measurements

At each station during the February and July sampling periods, the following meteorological and *in situ* parameters were measured: air temperature, percent cloud cover, wave height, current speed, and Secchi Disc depth and/or 1-percent light penetration depth (Table 2). Due to the riverine type of stations, there was complete mixing of the water at each station and no thermal stratification present. Therefore, sampling for water temperature, pH, conductivity, dissolved oxygen, and oxidation-reduction potential was conducted just below the surface (approximately 0.3 meter). For Stations 1 through 10, sampling was conducted on February 9, 11, and 13 and on July 13, 15, and 17, 1981. Due to the small size of the stream at Station 11 (Bigelow-Sanford Carpet Factory

Table 1. Richard B. Russell Preimpoundment Study—Water Quality Sampling Station Locations

Station Number	Name	Location and Description
1	Savannah River	Elbert Co., Georgia & Abbeville Co., South Carolina; Calhoun Falls; just downstream of Richard B. Russell Dam Site; width approximately 300 meters; depth generally 0.5 to 2.0 meters with pools to 3.0 meters.
2	Savannah River	Elbert Co., Georgia & Abbeville Co., South Carolina; Calhoun Falls; upstream of SC Highway 72 bridge; width approximately 300 meters; depth generally 0.5 to 1.5 meters with pools to 2.5 meters.
3	Rocky River	Anderson Co., South Carolina; Lowndesville; Abbeville County Road 64 bridge; width approximately 30 meters; depth 0.5 to 1.5 meters.
4	Beaverdam Creek	Elbert Co., Georgia; Beverly; Approx. 4.0 km east of Middleton at bridge across Beaverdam Creek; width approximately 30 meters; depth generally 0.5 meters with pools to 1.0 meters.
5	Coldwater Creek	Elbert Co., Georgia; Ruckersville; Elbert County Road 985 bridge; width approximately 14 meters; depth generally 0.2 to 0.5 meters.
6	Savannah River	Elbert Co., Georgia & Anderson Co., South Carolina; Iva; SC Highway 184 bridge; width approximately 150 to 200 meters; depth generally 2.0 to 3.0 meters.
7	Little Generostee Creek	Anderson Co., South Carolina; Iva; Bridge on SC Highway 187 extension; width approximately 15 meters; depth generally <0.5 meters with pools up to 2 meters.
8	Savannah River	Anderson Co., South Carolina & Hart Co., Georgia; Iva; SC Highway 181 bridge; width approximately 150 to 200 meters; depth generally 0.5 to 2.0 meters with pools to 3.0 meters.
9	Cedar Creek	Hart Co., Georgia; Hartwell; GA Highway 77 Spur bridge; width <15 meters; depth generally 0.2 to 0.5 meters.
10	Savannah River	Anderson Co., South Carolina & Hart Co., Georgia; Hartwell; just downstream of U.S. Highway 29 bridge; width approximately 150 to 200 meters; depth generally 1.0 to 2.0 meters.
11	Bigelow-Sanford Carpet Factory (stream)	Abbeville Co., South Carolina; Calhoun Falls; Approx. 3.2 km west of Springfield Church and upstream of bridge; 34°07'25"N 82°37'20"W; width <2.0 meters; depth <0.5 meters.
12	Upstream of Station 11	Abbeville Co., South Carolina; Calhoun Falls; Approx. 0.4 km northwest of Springfield Church and upstream of carpet factory influence. 34°07'30"N 82°36'55"W; width <20 meters; depth <0.5 meters.

Source: WAR, 1981.

Table 2. Richard B. Russell Preimpoundment Study—Water Quality Sampling Schedule for 1981 (Per Trip Basis)

	Stations			
Parameter	1-10	11	12*	Comments
1. METEOROLOGICAL DATA				
Air Temperature	3/Station	1	1	
Cloud Cover	3/Station	1	1	
2. WATER QUALITY SAMPLING†				
HYDROLOGICAL DATA				
Total Depth	3/Station	1	1	
Wave Height	3/Station	1	1	
Current Speed	3/Station	1	1	
PHYSICAL DATA				
Miscellaneous				
Cross-Section Location	3/Station	1	1	
Sample Depth	3/Station	1	1	
Secchi Disc Transparency and/or Depth of 1-Percent Surface Light	3/Station	1	1	
Field Measurements				
Water Temperature	3/Station	1	1	
Specific Conductance	3/Station	1	1	
Oxidation Reduction Potential	3/Station	1	1	
Dissolved Oxygen, Electrode	3/Station	1	1	
pH	3/Station	1	1	
Laboratory Data				
Biochemical Oxygen Demand	3/station	1	1	
Chemical Oxygen Demand	3/Station	1	1	
Color	3/Station	1	1	
Turbidity	3/Station	1	1	
Total Nonfilterable Residue	6/Station	2	2	Duplicate samples/station
CHEMICAL DATA				
Minerals and Metals				
Alkalinity	6/Station	2	2	Duplicate samples/station
Chloride, Total	6/Station	2	[illegible]	Duplicate samples/station
Calcium, Total	6/Station	2	2	Duplicate samples/station
Hardness, Total	6/Station	2	2	Duplicate samples/station

Table 2. Richard B. Russell Preimpoundment Study—Water Quality Sampling Schedule for 1981 (Per Trip Basis) (Continued, Page 2 of 5)

Parameter	Stations 1-10	11	12*	Comments
Minerals and Metals (Continued)				
Iron, Dissolved	6/Station	2	2	Duplicate samples/station
Iron, Total	6/Station	2	2	Duplicate samples/station
Manganese, Dissolved	6/Station	2	2	Duplicate samples/station
Manganese, Total	6/Station	2	2	Duplicate samples/station
Potassium, Total	6/Station	2	2	Duplicate samples/station
Sodium, Total	6/Station	2	2	Duplicate samples/station
Nutrients				
Carbon, Total Organic	6/Station	2	2	Duplicate samples/station
Carbon Dioxide, Free	6/Station	2	2	Duplicate samples/station
Nitrogen, Total Ammonia	6/Station	2	2	Duplicate samples/station
Nitrogen, Nitrate + Nitrite	6/Station	2	2	Duplicate samples/station
Nitrogen, Total Kjeldahl	6/Station	2	2	Duplicate samples/station
Nitrogen, Dissolved Kjeldahl	6/Station	2	2	Duplicate samples/station
Orthophosphate	6/Station	2	2	Duplicate samples/station
Phosphate, Total	6/Station	2	2	Duplicate samples/station
Phosphate, Dissolved	6/Station	2	2	Duplicate samples/station
BIOLOGICAL DATA				
Bacteriological Data				
Fecal Coliform	6/station	2	2	Duplicate samples/station
Fecal Streptococci	6/Station	2	2	Duplicate samples/station
Total Coliform	6/Station	2	2	Duplicate samples/station
3. SEDIMENT SAMPLING				
MECHANICAL DATA				
Grain size	1/Station	1	0	One composite sample; Single analysis
PHYSICAL AND CHEMICAL DATA				
Physical Data				
Volatile Solids	1/Station	1	0	One composite sample; Duplicate analysis
Miscellaneous Chemical Data				
Carbon, Total Organic	1/Station	1	0	One composite sample; Duplicate analysis
Nitrogen, Total Kjeldahl	1/Station	1	0	One composite sample; Duplicate analysis
Oil & Grease	1/Station	1	0	One composite sample; Duplicate analysis
Phosphorus, Total	1/Station	1	0	One composite sample; Duplicate analysis

Table 2. Richard B. Russell Preimpoundment Study—Water Quality Sampling Schedule for 1981 (Per Trip Basis) (Continued, Page 3 of 5)

Parameter	Stations 1-10	Stations 11	Stations 12*	Comments
Heavy Metals				
Arsenic, Total	1/Station	1	0	One composite sample; Duplicate analysis
Cadmium, Total	1/Station	1	0	One composite sample; Duplicate analysis
Chromium, Total	1/Station	1	0	One composite sample; Duplicate analysis
Copper, Total	1/Station	1	0	One composite sample; Duplicate analysis
Iron, Total	1/Station	1	0	One composite sample; Duplicate analysis
Lead, Total	1/Station	1	0	One composite sample; Duplicate analysis
Manganese, Total	1/Station	1	0	One composite sample; Duplicate analysis
Mercury, Total	1/Station	1	0	One composite sample; Duplicate analysis
Nickel, Total	1/Station	1	0	One composite sample; Duplicate analysis
Zinc, Total	1/Station	1	0	One composite sample; Duplicate analysis
Pesticides and PCBs				
Aldrin	1/Station	1	0	One composite sample; Single analysis
PCB-Aroclor 1242	1/Station	1	0	One composite sample; Single analysis
PCB-Aroclor 1254	1/Station	1	0	One composite sample; Single analysis
PCB-Aroclor 1260	1/Station	1	0	One composite sample; Single analysis
BHC-Alpha Isomer	1/Station	1	0	One composite sample; Single analysis
BHC-Beta Isomer	1/Station	1	0	One composite sample; Single analysis
BHC-Gamma Isomer	1/Station	1	0	One composite sample; Single analysis
Chlordane	1/Station	1	0	One composite sample; Single analysis
DDD	1/Station	1	0	One composite sample; Single analysis
DDE	1/Station	1	0	One composite sample; Single analysis
DDT	1/Station	1	0	One composite sample; Single analysis
Dieldrin	1/Station	1	0	One composite sample; Single analysis
Endrin	1/Station	1	0	One composite sample; Single analysis
Heptachlor	1/Station	1	0	One composite sample; Single analysis
Mirex	1/Station	1	0	One composite sample; Single analysis
Toxaphene	1/Station	1	0	One composite sample; Single analysis
4. BIOLOGICAL DATA				
BENTHOS				
PONAR Dredge	4/Station	4	0	Two replicate grabs at each of the four locations/station
Hester-Dendy	1	1	0	Composite sample of 14 plates/station
CHLOROPHYLL-a	6/Station	2	0	Duplicate samples/station
PERIPHYTON	1	1	0	Composite sample of 8 slides/station

Table 2. Richard B. Russell Preimpoundment Study—Water Quality Sampling Schedule for 1981 (Per Trip Basis) (Continued, Page 4 of 5)

Parameter	Comments
5. TISSUE ANALYSIS (NOTE: Sampled at Stations 2, 4, 6, 7, and 8)	
HEAVY METALS	
Arsenic	One composite sample/species; 4 species; Duplicate analysis
Cadmium	One composite sample/species; 4 species; Duplicate analysis
Chromium	One composite sample/species; 4 species; Duplicate analysis
Lead	One composite sample/species; 4 species; Duplicate analysis
Mercury	One composite sample/species; 4 species; Duplicate analysis
Selenium	One composite sample/species; 4 species; Duplicate analysis
Zinc	One composite sample/species; 4 species; Duplicate analysis
PESTICIDES AND PCBs	
PCB-Aroclor 1242	One composite sample/species; 4 species; Duplicate analysis
PCB-Aroclor 1254	One composite sample/species; 4 species; Duplicate analysis
PCB-Aroclor 1260	One composite sample/species; 4 species; Duplicate analysis
BHC-Alpha Isomer	One composite sample/species; 4 species; Duplicate analysis
BHC-Beta Isomer	One composite sample/species; 4 species; Duplicate analysis
BHC-Gamma Isomer	One composite sample/species; 4 species; Duplicate analysis
Chlordane	One composite sample/species; 4 species; Duplicate analysis
DDD	One composite sample/species; 4 species; Duplicate analysis
DDE	One composite sample/species; 4 species; Duplicate analysis
DDT	One composite sample/species; 4 species; Duplicate analysis
Dieldrin	One composite sample/species; 4 species; Duplicate analysis
Heptachlor	One composite sample/species; 4 species; Duplicate analysis
Methoxychlor	One composite sample/species; 4 species; Duplicate analysis
Mirex	One composite sample/species; 4 species; Duplicate analysis
Toxaphene	One composite sample/species; 4 species; Duplicate analysis
6. DIEL SAMPLING (NOTE: Sampled at Stations 2, 3, 4, and 10 on July 16 and 17, 1981)	
HYDROLOGICAL AND PHYSICAL DATA	
Total Depth	Once per 3-hour period
Cross-Section Location	Once per 3-hour period
FIELD MEASUREMENTS	
Water Temperature	Once per 3-hour period
Specific Conductance	Once per 3-hour period
Dissolved Oxygen, Electrode	Once per 3-hour period
pH	Once per 3-hour period

Table 2. Richard B. Russell Preimpoundment Study—Water Quality Sampling Schedule for 1981 (Per Trip Basis) (Continued, Page 5 of 5)

Parameter	Comments
CHEMICAL DATA	
Carbon, Total Organic	Once per 3-hour period
Carbon Dioxide, Free	Once per 3-hour period
Nitrogen, Total Ammonia	Once per 3-hour period
Nitrogen, Nitrate + Nitrite	Once per 3-hour period
Nitrogen, Total Kjeldahl	Once per 3-hour period
Orthophosphate	Once per 3-hour period
Phosphate, Total	Once per 3-hour period
Suspended Solids, Total	Once per 3-hour period

* Station 12 sampled during July only.
† Water quality sampling was performed on February 9, 11, and 13 and July 13, 15, and 17, 1981.

Source: WAR, 1981.

Table 3. Richard B. Russell Preimpoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	1. WATER QUALITY SAMPLING						
	PHYSICAL DATA						
	Miscellaneous						
00077	Secchi Disc Transparency	None	—	(in situ)	#8, Secchi disc, 20 cm.	--	m
00034	Depth of 1-Percent Surface Light	None	—	(in situ)	Protomatic Instruments underwater photometer	—	m
	Field Measurements						
00010	Water Temperature	None	—	(in situ)	Yellow Springs Instr. D.O. meter, 51B	—	°C
00094	Specific Conductance	None	—	(in situ)	Yellow Springs Instr. SCT meter, 33	—	umhos/cm @ 25°C
00090	Oxidation Reduction Potential	None	—	(in situ)	Photovolt pH meter 126A & ORP electrode	—	mv
00299	Dissolved Oxygen, Electrode	None	—	(in situ)	Yellow Springs Inst., D.O. meter, 51B	0.1	mg/1
00400	pH	None	—	(in situ)	Photovolt pH meter, Model 126A	—	std. units
	Laboratory Data						
00310	Biochemical Oxygen Demand	48 hrs	P,G	4°C	#2, Yellow Springs Instr. probe	1.0	mg/1
00340	Chemical Oxygen Demand	28 hrs	P,G	4°C H_2SO_4 to pH <2		0.5	mg/1
00080	Color	24 hrs	P,G	4°C	#2, 110.3 (@ 420 nm)	(var.)	Pt-Co units
00076	Turbidity	7 days	P,G	4°C	#2, 180.1	(var.)	FTU
00530	Total Nonfilterable Residue	7 days	P,G	4°C	#2, 160.1	5	mg/1

Table 3. Richard B. Russell Preimpoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 2 of 9)

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	1. WATER QUALITY SAMPLING (Continued)						
	CHEMICAL DATA						
	Minerals and Metals						
00410	Alkalinity, Total	14 days	P,G	4°C	#2, 310.1	1.0	mg/1 as $CaCO_3$/1
00940	Chloride, Total	28 days	P,G	None required	#2, 325.2	0.2	mg Cl/1
00916	Calcium, Total	6 mo	P,G	HNO_3 to pH <2	#2, 215.1	0.10	mg Ca/1
00900	Hardness, Total	6 mo		HNO_3 to pH <2	#2, 130.2	1.0	mg as $CaCO_3$/1
01046	Iron, Dissolved	6 mo	P,G	Filter on site, HNO_3 to pH <2	#2, 236.1	0.20	mg Fe/1
01045	Iron, Total	6 mo	P,G	HNO_3 to pH <2	#2, 236.1	0.06–0.20	mg Fe/1
01056	Manganese, Dissolved	6 mo	P,G	Filter on site, HNO_3 to pH <2	#2, 243.1	0.05	mg Mn/1
01055	Manganese, Total	6 mo	P,G	HNO_3 to pH <2	#2, 243.1	0.05	mg Mn/1
00937	Potassium, Total	6 mo	P,G	HNO_3 to pH <2	#2, 258.1	0.10	mg K/1
00929	Sodium, Total	6 mo	P,G	HNO_3 to pH <2	#2, 273.1	0.03	mg Na/1
	Nutrients						
00680	Carbon, Total Organic	28 days	P,G	4°C, H_2SO_4 to pH <2	#2, 415.1	1.00	mg C/1
00405	Carbon Dioxide, Free				Calculated	1.0	mg CO_2/1
00610	Nitrogen, Total Ammonia	28 days	P,G	4°C, H_2SO_4 to pH <2	#2, 350.1	0.005	mg N/1
00630	Nitrogen, Nitrate + Nitrite	28 days	P,G	4°C, H_2SO_4 to pH <2	#2, 353.2	0.005	mg N/1
00625	Nitrogen, Total Kjeldahl	28 days	P,G	4°C, H_2SO_4 to pH <2	#2, 351.2	0.15–0.25	mg N/1
00623	Nitrogen, Dissolved Kjeldahl	28 days	P,G	Filter on site, 4°C, H_2SO_4 to pH <2	#2, 351.2	0.15–0.25	mg N/1

Table 3. Richard B. Russell Preimpoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 3 of 9)

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	1. WATER QUALITY SAMPLING (Continued)						
	CHEMICAL DATA (Continued)						
	Nutrients (Continued)						
00671	Orthophosphate	48 hrs	P,G	4°C, Filter on site	#2, 365.2	0.002-0.005	mg P/1
00655	Phosphate, Total	28 days	P,G	4°C, H_2SO_4 to pH <2	#2, 365.2	0.002-0.005	mg P/1
00666	Phosphate, Dissolved	28 days	P,G	4°C, H_2SO_4 to pH <2, Filter on site	#2, 365.2	0.002-0.005	mg P/1
	BIOLOGICAL DATA						
	Bacteriological Data						
31616	Fecal Coliform	6 hrs	Sterilized	4°C	#1, p. 937	—	MPN/100 ml
31673	Fecal Streptococci	6 hrs	Sterilized	4°C	#1, p. 944	—	MPN/100 ml
31503	Total Coliform	6 hrs	Sterilized	4°C	#1, p. 928	—	MPN/100 ml
	2. SEDIMENT SAMPLING						
	MECHANICAL DATA						
	Grain Size						
80208	Bed Mtl. (% finer than 2.0 mm)	None	P	None	#3, Part 1, p. 552	—	%
80207	Bed Mtl. (% finer than 1.0 mm)	None	P	None	#3, Part 1, p. 552	—	%
80206	Bed Mtl. (% finer than 0.5 mm)	None	P	None	#3, Part 1, p. 552	—	%
80205	Bed Mtl. (% finer than 0.25 mm)	None	P	None	#3, Part 1, p. 552	—	%

Table 3. Richard B. Russell P· impoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 4 of 9)

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	2. SEDIMENT SAMPLING (Continued)						
	MECHANICAL DATA (Continued)						
	Grain Size (Continued)						
80204	Bed Mtl. (% finer than 0.125 mm)	None	P	None	#3, Part 1, p. 552	—	%
80203	Bed Mtl. (% finer than 0.063 mm)	None	P	None	#3, Part 1, p. 552	--	%
80181	Bed Mtl. (% finer than 0.002 mm)	None	P	None	#3, Part 1, p. 552	—	%
	PHYSICAL AND CHEMICAL DATA						
	Physical Data						
95040	Volatile Solids	14 days	P	4°C	#5, p. 5	0.15–0.3	% total dry weigt
	Miscellaneous Chemical Data						
00687	Carbon, Total Organic	30 days	P	4°C	#3, Part 2, p. 1372	0.05	% total dry wt.
00627	Nitrogen, Total Kjeldahl	30 days	P	4°C	#5, p. 43	20	mg N/kg dry wt.
00557	Oil and Grease	30 days	G	4°C	#5, p. 103	0.065–0.1	% total dry wt.
00668	Phosphorus, Total	30 days	P	4°C	#5, p. 51	0.7	mg P/kg dry wt.
	Heavy Metals						
01003	Arsenic, Total	3 mo	P	4°C	Nitric acid digestion, #2	0.3	mg As/kg dry wt.
01028	Cadmium, Total	3 mo	P	4°C	Nitric acid digestion, #2	0.05	mg Cd/kg dry wt.
01029	Chromium, Total	3 mo	P	4°C	Nitric acid digestion, #2	3	mg Cr/kg dry wt.
01043	Copper, Total	3 mo	P	4°C	Nitric acid digestion, #2	0.3	mg Cu/kg dry wt.
01170	Iron, Total	3 mo	P	4°C	Nitric acid digestion, #2	2	mg Fe/kg dry wt.
01052	Lead, Total	3 mo	P	4°C	Nitric acid digestion, #2	0.7	mg Pb/kg dry wt.
01053	Manganese, Total	3 mo	P	4°C	Nitric acid digestion, #2	25	mg Mn/kg dry wt.
71921	Mercury, Total	3 mo	P	4°C	Nitric acid digestion, #2	0.001–0.013	ug Hg/kg dry wt.
01068	Nickel, Total	3 mo	P	4°C	Nitric acid digestion, #2	4	mg Ni/kg dry wt.
01093	Zinc, Total	3 mo	P	4°C	Nitric acid digestion, #2	0.3	mg Zn/kg dry wt.

Table 3. Richard B. Russell Preimpoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 5 of 9)

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	2. SEDIMENT SAMPLING (Continued)						
	PHYSICAL AND CHEMICAL DATA (Continued)						
	Pesticides and PCBs						
39333	Aldrin	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39499	Aroclor 1242	1 mo	G	Freeze or 4°C	#6	25	ug/kg dry wt.
39507	Aroclor 1254	1 mo	G	Freeze or 4°C	#6	25	ug/kg dry wt.
39511	Aroclor 1260	1 mo	G	Freeze or 4°C	#6	25	ug/kg dry wt.
39076	BHC-Alpha Isomer	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
34257	BHC-Beta Isomer	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
95030	BHC-Gamma Isomer	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39351	Chlordane	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39311	DDD	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39321	DDE	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39306	DDT	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39383	Dieldrin	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39393	Endrin	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39413	Heptachlor	1 mo	G	Freeze or 4°C	#6	1	ug/kg dry wt.
39758	Mirex	1 mo	G	Freeze or 4°C	#6	10	ug/kg dry wt.
39403	Toxaphene	1 mo	G	Freeze or 4°C	#6	25	ug/kg dry wt.
	3. TISSUE ANALYSIS						
	PHYSICAL AND CHEMICAL DATA						
	Heavy Metals						
01004	Arsenic	—	P,G	Freeze	#2, **	0.5	mg As/kg wet wt.
71940	Cadmium	—	P,G	Freeze	#2, **	0.05	mg Cd/kg wet wt.
71939	Chromium	—	P,G	Freeze	#2, **	0.5	mg Cr/kg wet wt.
71936	Lead	—	P,G	Freeze	#2, **	0.05	mg Pb/kg wet wt.
71930	Mercury	—	P,G	Freeze	#2, **	0.006	mg Hg/kg wet wt.
01149	Selenium	—	P,G	Freeze	#2, **	0.5	mg Se/kg wet wt.
71938	Zinc	—	P,G	Freeze	#2, **	1.0	mg Zn/kg wet wt.

Table 3. Richard B. Russell Preimpoundment Study--Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 6 of 9)

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	3. TISSUE ANALYSIS (Continued)						
	PHYSICAL AND CHEMICAL DATA (Continued)						
	Pesticides and PCBs						
39497	PCB-Aroclor 1242	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	25	ug/kg wet wt.
39512	PCB-Aroclor 1254	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	25	ug/kg wet wt.
34670	PCB-Aroclor 1260	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	25	ug/kg wet wt.
39074	BHC-Alpha Isomer	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
34258	BHC-Beta Isomer	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
39075	BHC-Gamma Isomer	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
39349	Chlordane	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
39312	DDD	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.

Table 3. Richard B. Russell Preimpoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 7 of 9)

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	3. TISSUE ANALYSIS (Continued)						
	PHYSICAL AND CHEMICAL DATA (Continued)						
	Pesticides and PCBs (Continued)						
39322	DDE	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
39318	DDT	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
39387	Dieldrin	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
39414	Heptachlor	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	1	ug/kg wet wt.
	Methoxychlor	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	10	ug/kg wet wt.
	Mirex	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	10	ug/kg wet wt.
39407	Toxaphene	1 mo	G, Teflon™ lid; wrapped in aluminum foil	Freeze	#7	25	ug/kg wet wt.

Table 3. Richard B. Russell Preimpoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 8 of 9)

STORET Code	Parameter	Holding Time	Container*	Preservation Technique	Analytical Methodology†	Detection Limit	Units
	4. BIOLOGICAL DATA (Composite Samples)						
	WATER SAMPLES						
32211	Chlorophyll-a	None		Filter immed., Frozen, dark	#13, p. 14	0.1	ug/1
	MACROINVERTEBRATES						
	Benthic	None	P	10-% Formalin, (w/$Na_2B_4O_7$(sol) to pH 7.0-7.3), Rose Bengal	#13 (see Text)	1.0	No./sq m
	Hester-Dendy	None	P	10-% Formalin, (w/$Na_2B_4O_7$(sol) to pH 7.0-7.3, Rose Bengal	(see Text)	1.0	No./sq m
	PERIPHYTON						
	Periphyton	None	P	5-% Formalin, (w/$Na_2B_4O_7$(sol) to pH 7.0-7.3)	#9, 10, 11, 12 (see Text)	1.0	No./sq cm

* P = Plastic or G = Glass or N/A = Not Applicable.
† # = Reference to Source numbers (e.g., #1 = Source 1).
** As per instruction of David Kendall, COE, Savannah District, Savannah, Georgia.

SOURCES:

1. American Public Health Association, American Water Works Association, & Water Pollution Control Federation. 1976. Standard methods for the examination of water and wastewater, 14th ed. American Public Health Association, Washington, DC. 1,193 pp.
2. U.S. Environmental Protection Agency. March 1979. Methods for chemical analysis of water and wastes. Environmental Monitoring and Support Lab., Office of Research & Development, EPA, Cincinnati, Ohio. EPA-600/4-79-020. 298 pp.

Table 3. Richard B. Russell Preimpoundment Study—Water Quality Parameter STORET Codes, Maximum Holding Times, Preservation Techniques, Analytical Methodology, and Detection Limits (Continued, Page 9 of 9)

SOURCES (Continued):

3. American Society of Agronomy and American Society for Testing and Materials. 1965. Methods of Soil Analysis. Parts 1 and 2. American Society of Agronomy Inc., Madison, Wisconsin.
4. U.S. Environmental Protection Agency. 1969. Chemistry laboratory manual bottom sediments. Great Lakes Region Committee on Analytical Methods. 101 pp.
5. U.S. Environmental Protection Agency. March 1979. Chemistry laboratory manual for bottom sediments and elutriate testing. Surveillance and Analysis Division, Region V, Chicago, Illinois. EPA 905/4-79-014. 153 pp.
6. U.S. Environmental Protection Agency. 1977 (Revised). Analysis of pesticide residues in human and envirionmental samples, Method 11B. Health Effects Research Laboratory—Environmental Toxicology Division, Research Triangle Park, North Carolina. 6 pp.
7. U.S. Department of Health, Education, and Welfare and the Food and Drug Administration. 1978. Pesticide analytical manual, Volume 1, Methods which detect multiple residues.
8. Tennessee Valley Authority. 1978. Standard methods for routine water quality and aquatic biological field surveys manual. Division of Environmental Planning, Water Quality and Ecology Branch, TVA.
9. Utermohl, H. 1931. Neue wege in der quantitativen erfessung des planktons. Verh. Int. Ver. Limnol. 5:567-596.
10. Utermohl, H. 1958. Zur vervollkommug der quantitativen phytoplankton—methodik. Mitt. Int. Ver. Limnol. 9:1-38.
11. Werff, A. van der. 1953. A new method of concentrating and cleaning diatoms and other organisms. International Association of Theoretical Applied Limnology, Verhandlugen, Vol. 12:276-277.
12. Patrick, R. and C.W. Reimer. 1966. The diatoms of the United States. Vol. 1. Academy of Natural Sciences of Philadelphia Monograph No. 13. 688 pp.
13. Weber, C.I., ed. 1973. Biological field and laboratory methods for measuring the quality of surface waters and effluents. National Environmental Research Center, EPA, Cincinnati, Ohio. 171 pp.

stream), this stream was only sampled on February 13 and July 15. Station 12 was sampled only once on July 15.

In addition to the above sampling, a diel study also was conducted at Stations 2, 3, 4, and 10, beginning at Hour 1000 on July 16. Water temperature, pH, conductivity, dissolved oxygen, and chemical sampling were performed during each 3-hour interval at each of the diel stations.

All measurements were recorded in the appropriate section on the field data sheets as shown in Figure 2.

All field instruments (see Table 3) are calibrated against standards (or as specified) and provided with spare batteries and/or chargers before being sent into the field. In addition, appropriate standard solutions were sent to the field with the instrument. All instruments were rechecked upon return; necessary maintenance and/or provision for storage was accomplished as specified by the instrument manufacturer. When in use, instruments were calibrated prior to beginning a set of measurements and at a minimum of 4-hour intervals, with a final check at the end. Verification of calibration was run after every 10 samples or if any unusual reading was encountered. Any anomaly was recorded.

Instrument	Routine Calibration
Dissolved Oxygen Meter	Air calibration as specified. Calibrated versus Winkler titration if problems were suspected or after any membrane change.
pH Meter	Battery check and calibration against commercially available certified buffers.
Conductivity Meter	Calibrated daily against standard KCl solutions as specified in manual. Any deviation in reading from manual specifications was recorded in notes.

FIGURE 2. RICHARD B. RUSSELL PREIMPOUNDMENT STUDY – FIELD DATA SHEETS

Water and Air Research, Inc.
6821 S.W. Archer Road
P.O. Box 1121
Gainesville, Florida 32602

JOB: Savannah River

_______ Trip ___ Station ______ Sheet 1 of 2

Date __ / __ /81 Time _____ Observer __________

Total Depth (m) ______ X-Section Loc(% from R Bank look upstream) _____

IN SITU PARAMETERS

Cloud Cover (%) _______ Current: Speed (fps) _______ Air Temp. (°C) _______

Wave Height (m) _______ 1% Light Pen. Depth (m) _______ Secchi Disc (m) _______

Sample Depth (m)	Temp (°C)	pH	Cond. ($\frac{\mu mhos}{cm}$)	DO (mg/l) Probe/Wink	± ORP (mV)

WATER QUALITY SAMPLES Sample Depth (m) ________

Sample Container	No. Req'd*	Preservation Technique	Container Number(s)
1 liter plastic	1	4°C (BOD_5)	
1 liter plastic	2	4°C, filter (chlorophyll a)	
1 liter plastic	2	4°C, (Turb.,color,S.S., NO_{3+2}-N,T-Alk,Cl)	
½ liter plastic	2	4°C, no air space, analyze on site (CO_2)	
2 ounce plastic	2	filter, 4°C (ortho-P)	
½ liter plastic	2	4°C, H_2SO_4 to pH <2 (TKN,NH_4,COD,TP,TOC)	
½ liter plastic	2	4°C, HNO_3 to pH <2 (T-Fe,T-Mn,Ca,Na,K,Hard.)	
2 ounce plastic	2	filter,HNO_3 to pH<2,4°C (Dis-Fe, Dis-Mn)	
½ liter plastic	2	filter, H_2SO_4 to pH<2,4°C (Dis-TP, Dis-TKN)	
½ liter plastic, sterile	2	4°C, (Bact), analyze on site	

Comments: *Double numbers for spike replicate station. Replicate different station each sampling day (3 total).

FIGURE 2. RICHARD B. RUSSELL PREIMPOUNDMENT STUDY – FIELD DATA SHEETS (Continued, Page 2 of 3)

Trip ______ Station ______ Job: Savannah River Sheet 2 of 2

PERIPHYTOMETERS Containers: 1 liter jar

X-section location (% from R Bank look upstream) ______ Attachment ______

Placement Date __/__/81 Retrieval Date __/__/81

Container Number(s) ______ ______ ______ ______ ______

HESTER DENDY SAMPLES

X-section location (% from R Bank look upstream) ______ Buoy ____ or Float ______

Placement Date __/__/81 Retrieval Date __/__/81

Container Number(s) ______

PONAR DREDGE SAMPLES

X-Section Loc. (% from R Bank look upstream)	Depth (m)	Container Number(s)				

SEDIMENT SAMPLES

	Composite			
X-section Loc. (% from R Bank look upstream)	[0	33	67	100]
Sample Depth (m)				

Sample Container	No. Req'd	Preservation Technique	Container Number(s)
1 liter glass teflon-lined cap	1	4°C	
1 liter plastic	3	4°C	

PHOTOGRAPHS: ______

COMMENTS: ______

FIGURE 2. RICHARD B. RUSSELL PREIMPOUNDMENT STUDY – FIELD DATA SHEETS (Continued, Page 3 of 3)

Water and Air Research, Inc.
6821 S W. Archer Road
P.O. Box 1121
Gainesville, Florida 32602
JOB: Savannah River

DIEL Trip ____ Station ____ Sheet 1 of 1
Date __/__/81 Time ____ Observer ____
Total Depth (m) ____ X-Section Loc (% from Right Bank look upstream ____

IN SITU PARAMETERS

Sample Depth (m)	Temp (°C)	pH	Cond. ($\frac{\mu mhos}{cm}$)	DO (mg/l) Probe/Wink	Water Level
					High ____ Regular ____ Low ____

WATER QUALITY SAMPLES Sample Depth (m) ____

Sample Container	No. Req'd*	Preservation Technique	Container Number(s)	
½ liter plastic	1	H_2SO_4 to pH <2, 4°C (TKN, NH_4, TP, TOC)		
½ liter plastic	1	4°C (NO_{3+2}-N, S.S.)		
2 ounce plastic	1	filter, 4°C (ortho-P)		
½ liter plastic	1	filter, H_2SO_4 to pH <2 4°C (Dis-TKN, Dis-TP)		
½ liter plastic	1	4°C, no air space, analyze on site (CO_2)		

COMMENTS:

COMMENTS: *Double numbers for spike replicate station. Replicate each station once during diel (4 total).

Temperature Functions	Checked against mercury thermometer daily. Any deviation was reported in notes.
Current Meter	Circuit check. Daily check of zero. Yearly factory recalibration.

Water Quality Sampling and Analysis

Water samples for laboratory analysis were collected at Stations 1 through 10 on February 9, 11, and 13 and July 13, 15, and 17, 1981. Samples from Station 11 were collected only on February 13 and July 15. Station 12 was sampled on July 15 only. In addition, a diel study was performed at Stations 2, 3, 4, and 10 on July 16 through 17 with sampling intervals of 3 hours.

At all stations, water samples were collected just below the surface (approximately 0.3 meters) due to the absence of stratification. Sampling depth and total water depth were recorded on the field sheets (see Figure 2). Duplicate water samples were collected [except for biological oxygen demand (BOD)] at each station as specified in the scope of work. One station per day was collected in quadruplicate, with other replication and spiking in accordance with the Quality Assurance Plan of Water and Air Research, Inc. (WAR). At all stations except Stations 6 and 8, a 19-liter (5-gallon) carboy and sample bottles for bacteriology, carbon dioxide (CO_2), and BOD were filled directly from the river or creeks while at the stations. Due to difficult river access, sampling was performed from the bridges with a horizontal water sampler at Stations 6 and 8. Water sample bottles for the other chemical parameters were filled from the carboy upon return to the field laboratory in Elberton, Georgia. Samples were analyzed for those parameters listed in Table 2 according to the procedures in Table 3. All preservatives were added to the appropriate sample container while in the field and the samples returned (on ice) to WAR's Gainesville, Florida laboratory. All chemical analyses were performed in WAR's laboratory, except for free CO_2, which was determined by an alkalinity titration method while in the field.

When the samples reached the laboratory, they were immediately logged-in by date in the permanent laboratory record. Each sample was given a unique laboratory number and, when feasible, the sample's preservation was also checked. Prior to assigning WAR laboratory numbers to the samples, the samples were blinded. Samples were then stored, as specified according to the analyses to be run (normally at 4°C), until analyzed.

Chemical analyses of the water samples strictly adhered to the procedures listed in Table 3. Any deviation from these specifications is noted in the reported data. Analytical data sheets were prepared whenever analyses were performed. These data sheets include all information concerning methods used, instrument settings, date analyzed, analyst, etc. All analytical readings and calculations appear on the data sheets and were turned-in daily, checked, and filed. Any unusual appearance of the samples or results was also recorded on the data sheets. Calculation of the results of analyses was accomplished as soon as possible following completion of the analyses to facilitate assessment of the control exercised by standards, replicates, and spiked samples.

The list of analyses given in Table 4 were subcontracted. Liaison with each subcontractor assured that the methods specified in Table 3 were followed in every case. Sample integrity records were maintained and documentation of shipment was preserved as part of the permanent laboratory record. Quality control samples were included in each shipment to provide quality control independent of the subcontractor. These control samples were not specifically identified to the subcontractor. WAR's laboratory supervisor was responsible for monitoring the analytical performance of each subcontractor.

Quality control assurance followed the procedures of WAR's Quality Assurance Plan. The following sections are brief summaries of the procedures and methods employed. Short-cuts were not permitted and any

Table 4. Richard B. Russell Preimpoundment Study—Subcontracted Water Quality Analyses

Parameter	Subcontractor	Transmission Method
Water Samples		
TOC	CH2M-Hill	Courier
COD	CH2M-Hill	Courier
Sediment Samples		
Mechanical Analysis	UF	Courier
TOC	UF	Courier
Cd	ABC	Courier
Pb	ABC	Courier
Hg	ABC	Courier
As	TSI	Courier
Tissue Samples		
May Analyses		
Arsenic, Mercury, and Selenium for Replicate A Samples	TSI	Courier
All Metal Analyses for Replicate B Samples	TSI	Courier
July-August Analyses		
All Metal Analyses for Replicate A and B Samples	TSI	Courier

NOTES: CH2M-Hill = CH2M-Hill, Southeast, Environmental Laboratories, 201 N.W. 11th Place, Gainesville, Florida 32601.

UF = University of Florida, Soil Science Laboratory, Gainesville, Florida 32601.

ABC = American Bacteriological and Chemical Research, Corp. 3437 S.W. 24th Avenue, Gainesville, Florida 32608.

TSI = Technical Services, Inc. 105 Stockton Street, Jacksonville, Florida 32201.

Source: WAR, 1981.

abnormalities were immediately brought to the attention of WAR's laboratory supervisor.

Calibration Checks--These checks were performed before using any instrument and the calibration was recorded on the analytical data sheet. Daily logs of oven, refrigerator, and incubator temperatures were maintained with this equipment.

Gravimetric Analysis--Accuracy of analytical balances was monitored with a standard weight set and the results were recorded on log sheets. Calibration checks and routine maintenance is performed biannually by an established contractor.

Titrimetric Analyses--The method was checked daily against a standard solution. The results were recorded on the data sheet and as part of the accuracy control data.

Colorimetric Analyses--A standard curve of at least five standards of different concentrations plus reagent blanks was run daily. More points were run if required. The results of standards were recorded on the data sheet and also as a part of the accuracy record.

Instrumental Analyses--The Atomic Absorption Spectrophotometer and the Technicon Autoanalyzer II had daily calibration curves constructed. Instrument settings were recorded on the data sheet and as a part of the instrument record.

pH meters, conductivity meters, and turbidimeters were calibrated as necessary and the calibration was checked ... er every 10 samples. Notation that the calibration was made was entered on the data sheet.

The laboratory deionized water supply's resistance was continuously monitored and maintained at 1 mega ohm. Deionized water blanks were always included in analyses to control possible contamination from this source.

Precision and Accuracy Control--Shewhart type (EPA, 1979) precision and accuracy control charts were maintained for all routine laboratory analyses. These charts are annually updated using the entire data base generated by the laboratory for the preceding year's work. These charts are maintained as a permanent laboratory record.

In this study, precision was also monitored by analysis of duplicate samples. Most samples obtained during the February and July sampling cycles were split in the field by filling two separate containers from the same grab sample. An additional sample was duplicated within a given analytical set. The difference between the field duplicates was compared with the control limits on the quality control chart. If the difference exceeded the warning limits, the difference between the in-house duplicate was compared. If the in-house and field differences exceeded the warning limits, the whole set of analyses was repeated. If the field duplicates exceeded the warning, but the in-house duplicate was in control, each of the field duplicates was run again to verify that the difference was due to sampling rather than analytical procedure.

Daily monitoring of the accuracy of the analytical work was accomplished by comparing the results of recovery of known spikes from replicated spiked samples. One in every 10 samples was spiked and at least one spiked duplicated sample was included on each sample set. The difference between the recovered value for the spike versus the normal spike value was compared with the accuracy chart warning limit. If this value exceeded the warning limits, the analysis for the set of samples was repeated. The results of the spike recoveries were recorded on the accuracy chart. Spiked sample analyses were run for all nitrogen and phosphorus forms, chlorides, and all metals.

In addition to the in-house accuracy control, quality control assurance was monitored by participation of WAR's laboratory in the EPA and Florida DER Round Robin Performance Evaluation.

Bacteriological Sampling and Analysis

Bacteria grab samples were collected in two 500-milliliter (ml) sterile bottles at a depth of 0.3 meter below the water's surface. Sampling was conducted at the same time as other water quality sampling. Analyses for fecal coliforms (FC), total coliforms (TC), and fecal streptococci (FS) were run in the field laboratory according to the method shown in Table 3. For both FC and TC culture media, pre-prepared ampules from Millipore Corporation were used in the field. KF streptococcus agar (BBL Microbiology Systems) plates were prepared in the laboratory during the week prior to sampling. All media was maintained at 4°C while in the field.

Precision control was tested by analyzing each station each day in duplicate. Results were considered consistent if the 95-percent confidence intervals for both replicates overlapped.

Sediment Sampling and Analysis

Bottom sediment samples were collected with an epoxy coated Ponar™ dredge [small size, 15.24 centimeters (cm)/side]. Four equally spaced samples were collected across the width of the stream at Stations 1 through 11, beginning and ending at the shorelines. These samples were composited into a single representative sample at each station. If rock was encountered such that a grab could not be obtained, a sample was obtained at another point along the cross-sectional location at that station.

Samples to be analyzed for organochlorine pesticides and PCBs were stored at 4°C in widemouth glass jars with Teflon™-lined caps and extracted within 1 week. Samples to be analyzed for metals were stored at 4°C in widemouth plastic jars with plastic-coated paper-lined caps. Preservation of sediment samples for metals, pesticides, and PCBs was performed according to the procedures specified in Table 3.

In the laboratory, mechanical analyses were performed according to "Standard Method for Particle Size Analysis of Soils, ASTM D422-63" as specified in Table 3. Analyses of sediment samples for metals, pesticides, and PCBs also were performed according to the procedures specified in Table 3. For metal analyses, two replicate extractions and analyses of each parameter were performed on each composite sample collected at each station. A single analysis was performed on sediment samples for pesticide and PCB analyses.

Periphyton Sampling and Analysis

Periphyton samples were collected at Stations 1 through 11 with Periphytometer™ artificial substrate samplers. Samplers were attached to foam-filled floats and left in place at each station for 4 weeks prior to collection in February and July. Each sampler held eight 25.4- by 76.2-millimeters (mm) slides (either glass or plexiglass) in a vertical position. At least two samplers (one with glass slides and one with plexiglass slides) were placed at each station to ensure recovery of one set of slides. Samplers' physical conditions were set as near to identical as visually possible between stations to reduce variability. However, due to extremely large variations in stream width, flow, shading, etc., the actual conditions at each station probably were quite different. Upon collection of the samplers, the slides were removed, placed into 0.95-liter (1-quart) plastic jars, and preserved in a 4-percent formalin solution.

In the laboratory, the periphyton field data were transferred to a permanent log book and the samples checked against this record. The slides in each jar were removed, their surfaces scraped with a razor blade and/or rubber scrapper, and the periphyton washed back into the original jar compositing all eight slides in each sampler. The primary reason for this was the very limited periphytic growth on the slides at some stations during February. This method provided sufficient material to

work with and also gave a more accurate overall station characterization by averaging-out any within-sampler slide-to-slide variation which may have been present. The contents of the jar were then rapidly swirled, poured into a graduated cylinder, and the volume brought up to a standard volume (usually 200 or 500 ml) with additional 4-percent formalin solution. The sample was then poured back into the original jar.

Periphyton analysis was then performed by the Utermöhl (1931, 1958) method. Each sample was thoroughly mixed and a known aliquot (following serial dilution if necessary) of usually 5 to 10 ml was transferred into a standardized plankton sedimentation chamber with a known settling area of 397.6 square millimeters (mm^2). After 24 hours of settling, the chamber was placed on a Zeiss Invertoscope "D" microscope (magnification to 1,000X) and 500 to 1,000 cell counts were made for each sample. Cell counts were made by counting all organisms within the field along at least two perpendicular transects of the chamber. For colonies and filaments consisting of a large number of cells, 1/4 or 1/2 of the colony or filament was counted and this resultant number multiplied to obtain the number of cells for the entire colony or filament. Empty algal cells or diatom frustules were not included in the counts. Identified cells were recorded on standardized bench sheets and later converted to number of cells/square centimeter (cm^2) for each taxon in the water sample using the following conversion equation:

$$\text{cells/cm}^2 = \frac{C\ A\ V_t}{N_t\ T\ S\ V_a\ N_s} \times 100\ \text{mm}^2/\text{cm}^2$$

where C = Number of cells counted,

A = Area of chamber bottom (397.6 mm^2),

N_t = Number of transects counted,

T = Area of one transect at 1,000X magnification (4.95 mm^2),

V_t = Total volume of sample (ml),

V_a = Volume of aliquot (ml),

S = Area of one microscope slide/two sides (3,871 mm^2), and
N_s = Number of slides composited.

All organisms were identified to species where possible. The following major standard taxonomic references were used for identification: Schmidt, et al., 1874-1879; Heurck, 1896; Hustedt, 1927-1930, 1930, 1931-1959, 1949, 1961-1966; Huber-Pestalozzi, 1938, 1941, 1950, 1955, 1961; Huber-Pestalozzi and Hustedt, 1942; Smith, 1950; Cleve-Euler, 1951-1955; Prescott, 1962; Bourrelly, 1966-1970; Patrick and Reimer, 1966, 1975; VanLandingham, 1967-1979; Whitford and Schumacher, 1973; and Schoeman and Archibald, 1976-1980. Other minor references too numerous to list also were used.

Since the classification of diatoms is based primarily on the shape and markings of the cell wall, critical identifications can only be performed if the diatoms are cleaned (all organic matter removed); thereby leaving only the silica cell walls. Diatom identification was facilitated by cleaning approximately 30 ml of some of the initial samples using the hydrogen peroxide method (Werff, 1953; Patrick and Reimer, 1966). This involved placing the aliquot in a 2,000-ml beaker and adding approximately 50 ml of 30-percent hydrogen peroxide. A small amount (0.1 to 0.2 gram) of potassium dichromate was added (resulting in a purple solution); in a few moments an exothermic reaction began. This resulted in a violent heating and boiling of the mixture, which oxidized all of the organic matter within the solution, including that contained within the diatoms.

Upon completion of this aqueous combustion reaction, the solution turned yellow and the mixture was then transferred to a 300-ml tall-form beaker, filled with distilled water, and allowed to settle 6 to 24 hours. The diatomaceous material settled to the bottom and formed a delicate flocculent layer. The sample was then decanted at least three times to remove the chemicals (using distilled water to refill the beaker after each decanting). The cleaned diatoms were then poured into a storage

vial and enough alcohol added to make at least a 30-percent solution to inhibit growth of fungi.

Permanent slides were made of the cleaned diatoms with Hyrax mounting medium. Clean #1 coverslips (22 mm^2) were flooded with water containing different concentrations of the suspended diatoms and allowed to air dry at room temperature or on a low-temperature hot plate. When dry, the coverslip was heated to 500°C for 5 to 10 minutes and then inverted into a drop of Hyrax on a slide. The slide was then heated for a few minutes at 300 to 400°C until the Hyrax stopped bubbling under the coverslip. This allowed time for the penetration of the diatom frustules by the Hyrax and the evaporation of the solvent. The slide was then allowed to cool while pressing the coverslip down so that it would lie flat on the slide. The Hyrax hardened rapidly and the excess along the edges was scraped off with a razor blade. The slide was then wiped clean with acetone. Initial diatom identifications were made from these slides. If identification difficulties arose in other samples during the study period, portions of these samples also were cleaned and permanent slides made to facilitate diatom identifications.

Voucher specimens of difficult taxa were sent to Dr. C.W. Reimer, Academy of Natural Science of Philadelphia (diatoms) and Dr. J.B. Lackey, Professor Emeritus, University of Florida (green and blue-green algae) for taxonomic verification.

Macroinvertebrate Sampling and Analysis

Four equally spaced benthic samples were collected with a small [15.24 cm/side, 0.023 square meter (m^2)] Ponar™ dredge across the width of the stream at Stations 1 through 11 in February and July. Each of the four samples collected per station consisted of a composite of four replicate Ponar™ samples (0.1 m^2 total area sampled). When possible, each composite sample was immediately washed in a U.S. Standard No. 30 mesh sieve. The sample was then placed in a 0.95-liter (1-quart)

wide-mouth plastic jar and the sample preserved in a 10-percent formalin solution with Rose Bengal stain added.

Macroinvertebrates were also sampled using Hester-Dendy samplers left in place at each station for 4 weeks prior to collection in February and July. The Hester-Dendy sampler used was that which is recommended for EPA biologists. The sampler consists of fourteen 7.5-cm diameter plates, and twenty-four 2.5-cm diameter spacers, constructed of 0.625-cm thick tempered fiberboard, strung together on an eyebolt so that there are eight single-spaces, one double-space, two triple-spaces, and two quadruple-spaces between the plates. This sampler has an effective surface area of 0.13 m^2.

The samplers were attached to foam-filled floats and suspended within 1 meter of the surface. This procedure was used because of the shallow water depths and the large water level fluctuations at most stations due to the periodic releases of water from Hartwell Dam. Each sampler was collected by placing a cloth bag around it from underneath and lifting it from the water in the bag. Samplers were then identified as to collection location and preserved in a 19-liter (5-gallon) Roper™ bucket containing a 10-percent formalin solution. These samplers were not re-used, as it was very difficult to remove the formalin from the fiberboard.

Upon arrival at WAR's laboratory, all benthic macroinvertebrate samples were washed in a U.S. Standard No. 30 mesh sieve, which was partially immersed in a pan of water. This method removed formalin, excess Rose Bengal stain, and the remaining silt and clay. The sample was then placed, in manageable aliquots, in a white enamel pan for removal of organisms (sorting). Tapwater was allowed to flow slowly over the sediment, thus buoying the lighter benthic organisms up and out of the enamal pan into a U.S. Standard No. 30 mesh sieve. This elutriation technique enabled rapid separation of organisms from the substrate. The washed substrate was analyzed for the heavier benthos (i.e., mollusks). The organisms were then placed in 5-ml vials in 60-percent ethanol, and the

vials labeled as to project, type of substrate, collection trip, station number, and cross-sectional location.

In the laboratory, the Hester-Dendy samplers were removed from the Roper™ bucket and the cloth bag was everted into a U.S. Standard No. 30 mesh sieve placed in a white enamel pan. The sampler was then removed and disassembled. The bag, sampler, and organisms were rinsed to remove the formalin and accumulated sediments. All 14 plates of the sampler were then scraped with a razor blade and the organisms washed into the sieve. The organisms were then sorted, placed into vials, preserved, and the vials labeled following the same methodology used for the benthic macroinvertebrates.

Biomass measurements were determined on a mean weight basis. Approximately 10 organisms of each taxon were blot-dried and weighed. The mean weight for each taxon was then multiplied by that taxon's density in a sample to determine its biomass in the sample. The individual taxon biomasses were then added together to give the total biomass for the sample.

Organisms were identified with an American Optical Stereoscopic Microscope (7X to 80X) and a Swift Trinocular Microscope (40X to 400X). The Chironomidae and Oligochaeta were grouped under low magnification and representative specimens were selected for microscope slide mounts, from which the identifications were made. Chironomids were mounted in CMC-10, which contains a clearing agent and makes excellent semi-permanent slides. Oligochaetes were permanently mounted in Coverbond™, which does not contain a clearing agent. Organisms could be removed and remounted, if necessary, with either of these mounting media.

Taxonomic references used were Beck (1962, 1976); Beck and Beck (1969a and b; 1970); Curry (1958); Hilsenhoff (1975); Mason (1973); Parrish (1968); Roback (1963, 1969); Brinkhurst and Jamieson (1971); Brown (1972); Edmunds, et al. (1976); Holsinger (1972); Thompson (1968);

Usinger (1956); Wiggins (1977); Pennak (1978); Hiltunen and Klemm (1980); and Saether (1977). Taxonomically difficult and ecologically important species were identified or verified by experts in their respective fields: William Beck, Florida A&M University for Chironomidae and Michael Loden, Louisiana State University for Oligochaeta. Other authorities were consulted for the less frequent taxa, and for specific groups within the Insecta (such as Dr. Minton J. Westfall, University of Florida, for Odonata).

The Shannon-Weaver Species Diversity Index, $\overline{H}$ (Odum, 1971) was calculated using the following expression:

$$\overline{H} = \sum_{i=1}^{t} \left[\frac{n_i}{N} \log_2 \left(\frac{n_i}{N}\right)\right]$$

where n_i = Total number of organisms present as taxon *i*;

$N = \sum_{i=1}^{t} n_i$ = Total number of organisms present in the sample; and

t = Number of taxa present in the sample.

$\overline{H}$ ranges from a minimum of 0.0, occurring when all organisms belong to the same taxon (no diversity), to a maximum of $\log_2 N$, occurring where each organism present belongs to a unique taxon (maximum diversity).

<u>Tissue Sampling and Analysis</u>

At Stations 2, 4, 6, 7, and 8, two invertebrate and two vertebrate species were collected at each station for metal, pesticide, and PCB analysis of their body tissues. Invertebrate species collected were two species of crayfish (<u>Cambarus bartonii</u> from the river stations and <u>Procambarus raneyi</u> primarily from the stream stations), caddisfly larvae (<u>Hydropsyche</u> sp.) from the river stations, and hellgrammites [<u>Corydalus</u>

(Corydalis) sp.] from the two stream stations (Stations 4 and 7). In July, cranefly larvae (Tipula sp.) were also collected and analyzed from Station 8 since insufficient caddisfly larvae were found at Station 6. The sampling areas for crayfish and hellgrammites were located in the vicinity of the normal water quality stations. However, caddisfly larvae were collected 0.8 km upstream of Station 6 and 2.4 km downstream of Station 2, due to the lack of suitable habitat at these two stations.

Silver redhorse suckers (Moxostoma anisurum) were collected at Stations 4, 6, 7, and 8. At Station 2 they were collected 2.4 km below the station, due to the lack of suitable habitat at Station 2. For the second vertebrate fish species, redbreast sunfish (Lepomis auritus) were collected at Stations 4 and 7. Due to the lack of suitable habitat at Station 6 for sunfish, collections of redbreast sunfish from Gregg Shoals (located approximately 4.8 km downstream of Station 6) were used for the second fish species at this station. For the second fish species at Station 8, bluegills (Lepomis macrochirus) collected just below Hartwell Dam (Station 10) were used due to the lack of redbreast sunfish at Station 8. Again, due to the lack of suitable habitat for fish at Station 2 (such as deep pools and/or fallen trees or stumps along the shore), white bass (Morone chrysops) from 2.4 km downstream of Station 2 were used for the second fish species from the lower part of the study area. An unsuccessful attempt was made at this location to catch either redbreast sunfish or bluegills with fish baskets and rod and reel.

An initial collection was made in February as stated in the scope of work. However, due to the time of the year and the low water temperatures at the stations (approximately 5°C), this collection was very unsuccessful. A second trip was made in April; silver redhorse suckers were collected at all stations except Stations 2 and 7, crayfish were collected at all stations except Stations 4 and 7, and hellgrammites were collected from Stations 4 and 7. At this time, the water temperature being released from Hartwell Dam was 13°C and few redbreast sunfish

or bluegills were caught. Therefore, a third collection trip was made in May to complete the invertebrate and vertebrate collections. Although not abundant at Stations 6 and 8, caddisfly larvae were collected from the river stations instead of mayfly or stonefly larvae due to the caddisfly's higher body weights and greater abundance below Station 2. Chemical analyses were performed on only the April and May collections because of the very limited collections in February. In July, the same species were used at each station that were collected during the April and May collections, except that green bullheads (Ictalurus brunneus) were collected at Stations 4 and 7 since silver redhorse suckers were scarce in the tributaries at this time of the year.

Upon collection, all fish were identified and recorded in a field log book. Each fish was then wrapped in aluminum foil with a label containing collection information (collection number, species, date, location, method of collection, and fish length) included. The collection number was written on the outside of the foil with a permanent marker. The crayfish were identified and also recorded in the field log book. They were then wrapped collectively from each station in aluminum foil and placed in zip-lock bags with the collection information written on the bag or they were placed in labeled 0.95-liter (1-quart) glass Mason jars. Insect larvae were placed into precleaned 0.95-liter (1-quart) glass Mason jars, drained of river water, and rinsed several times with deionized water. The jars were then capped with either Teflon™ or aluminum-foil liners and labeled with the date, insect species, and station number. All organisms were packed and maintained on wet ice at 4°C prior and during shipment back to WAR's laboratory.

Upon arrival at WAR's laboratory, the crayfish and insect larvae were logged-in, weighed, and frozen on dry ice. The frozen crayfish specimens were then diced into 6.4-mm (1/4-inch) to 9.5-mm (3/8-inch) cubes and blended with dry ice to homogenize and powder them. The powdered samples were stored at -20°C until extraction. Insect larvae were also stored frozen at -20°C in either aluminum foil or in Teflon™-lined glass jars until extracted.

Upon arrival of the fish at WAR's laboratory, they were logged-in, weighed, and the identifications checked. Any fish of uncertain identifications (such as hybrids and crosses) were verified by Dr. Carter Gilbert at the Florida State Museum, Gainesville, Florida. Following routine observation for unusual appearances, etc., the samples were gutted, skinned, and filleted. The fillets were chopped into approximately 6.4-mm (1/4-inch) cubes and subsequently frozen (each individual cube) on dry ice. The pieces were then placed in a Mason jar and stored at -20°C. Before extraction, the pieces were blended with dry ice to homogenize and powder them. For composite samples, 20-gram aliquots of each individual filleted fish were taken and blended together with dry ice to homogenize them. The blended composite was stored at -20°C in a Mason jar until extraction.

All tissue extractions and analyses were performed in duplicate. Analyses of the fish, crayfish, and insect larvae tissue samples were performed according to the procedure listed in Table 3 (Source 7, Section 211.13F), but modified by filtering the supernatant through a vacuum filtration apparatus equipped with glass fiber filters and a small amount of anhydrous sodium sulfate, instead of filtering it through a 12-cm Buchner funnel fitted with two shark-skin papers.

RESULTS AND DISCUSSION

RESULTS AND DISCUSSION

The following discussion is intended to summarize the data shown in Appendices A through G and to highlight the trends in water quality observed during the two major sampling periods (February and July, 1981) of the Richard B. Russell Preimpoundment Water Quality Study.

Station Characterizations (See Figures 3 through 32)
Within the study area, the riverbed of the Savannah River is relatively straight with steep hillsides along both banks of the river and along its tributaries. As noted in the Introduction, flow in this portion of the Savannah River is governed by releases from Hartwell Dam during periods of peak power generation. Fishing is the primary recreational use of the Savannah River and some of its tributaries within the study area. Swimming and boating are less desirable due to the cold water temperatures and the large flow fluctuations in the river. Extensive hunting for game animals and birds (e.g., deer and turkeys, respectively) also occur along the Savannah River and its tributaries within the study area.

No outfalls or other noticeable point sources of pollution were noted within the study area, except for just upstream of Station 11 where the outfall from the Bigelow-Sanford Carpet Factory is located. Except near Station 9, no houses are located adjacent to the Savannah River or along its tributaries in the vicinity of the water sampling locations.

Vegetation in the vicinity of the sampling locations (Table 5) can be grouped into aquatic, streambank, and upland communities. Aquatic vegetation is that which occurs in the river or stream channel and may be either submerged or emergent. Streambank vegetation is that which occurs immediately adjacent to the stream channel; it may occupy a "ledge" or floodplain along the Savannah River (Stations 1, 2, 6, 8, and 10) or it may simply overhang the banks of a narrow stream channel (at tributary Stations 3, 4, 5, 7, and 9). The upland communities occupy the hillsides and are seldom, if ever, flooded.

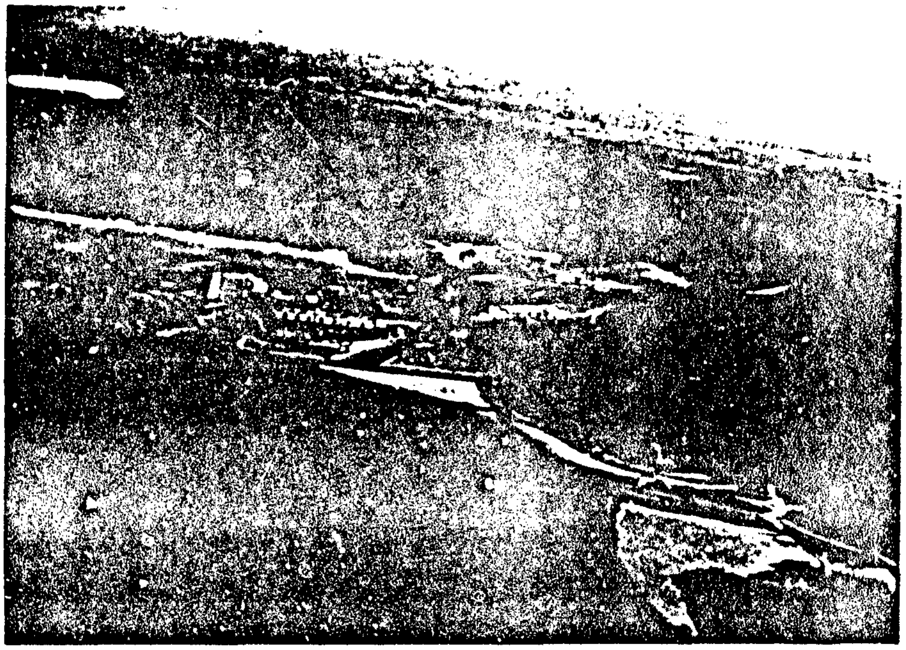

Figure 3. Station 1--Savannah River View Looking Upstream Toward Richard B. Russell Dam Site--November 20, 1981

Figure 4. Station 1--Savannah River View Looking Upstream from Boat Ramp Toward Diversion Channel on West Side of Richard B. Russell Dam Site--February 11, 1981

Figure 5. Station 2--Savannah River View Looking Upstream Toward Future South Carolina/Georgia State Highway 72 Bridge Location and Present South Carolina/Georgia State Highway 72 Bridge--November 20, 1980

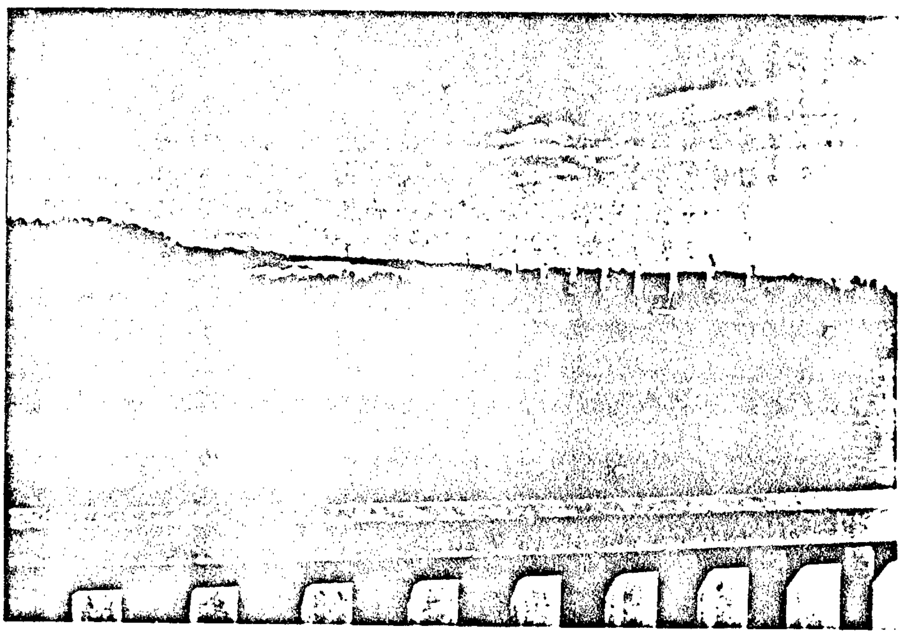

Figure 6. Station 2--Savannah River View Looking Upstream from Present South Carolina/Georgia State Highway 72 Bridge Toward Location of New Seaboard Coast Line Railroad Bridge--January 13, 1981

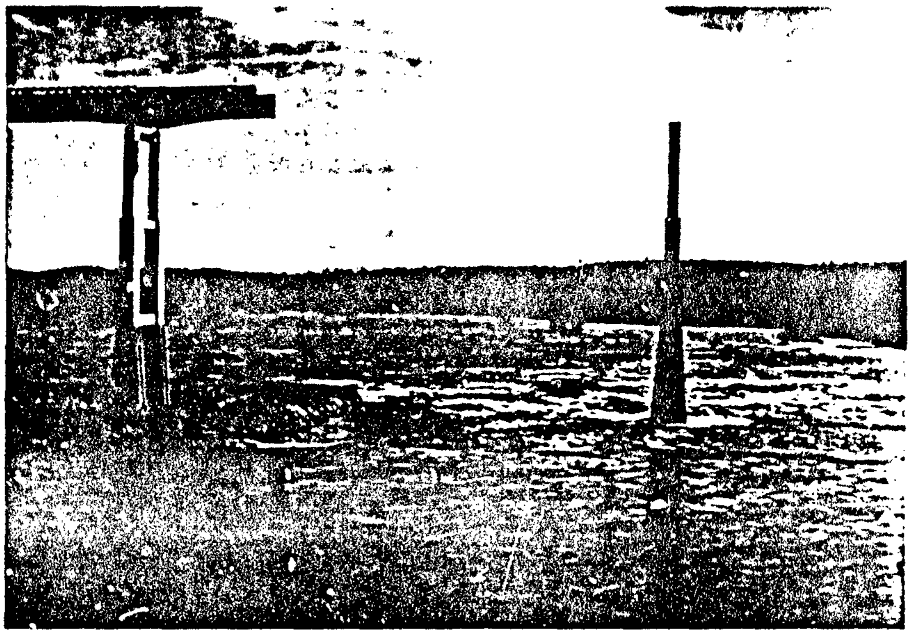

Figure 7. Station 2--Savannah River View Looking Downstream from Present South Carolina/Georgia State Highway 72 Bridge Toward Future South Carolina/Georgia State Highway 72 Bridge--January 13, 1981

Figure 8. Station 6--Savannah River at South Carolina State Highway 184 Bridge (Upstream View)--November 20, 1980

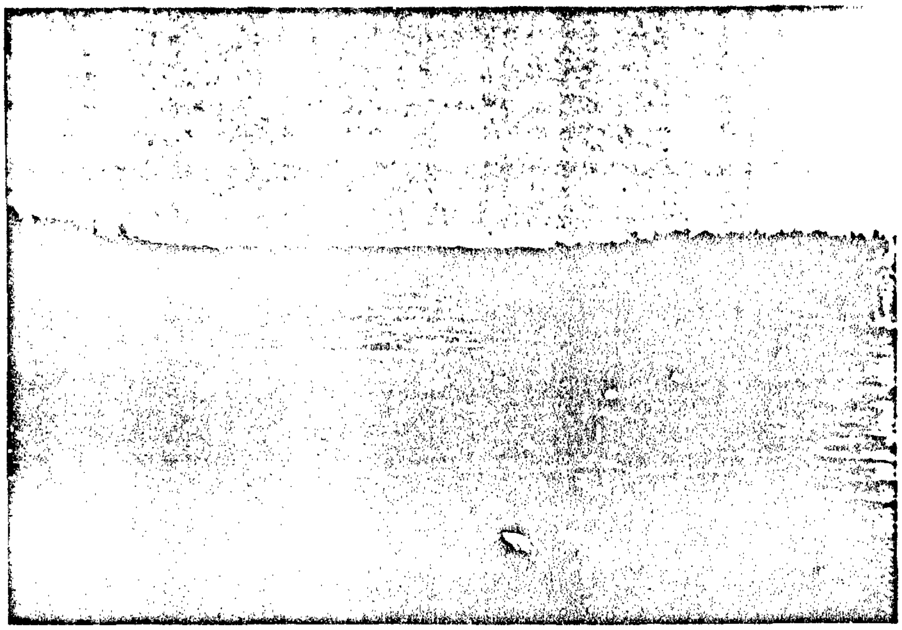

Figure 9. Station 6--Savannah River View Looking Upstream from South Carolina State Highway 184 Bridge--January 14, 1981

Figure 10. Station 6--Savannah River View Looking Downstream from South Carolina State Highway 184 Bridge--January 14, 1981

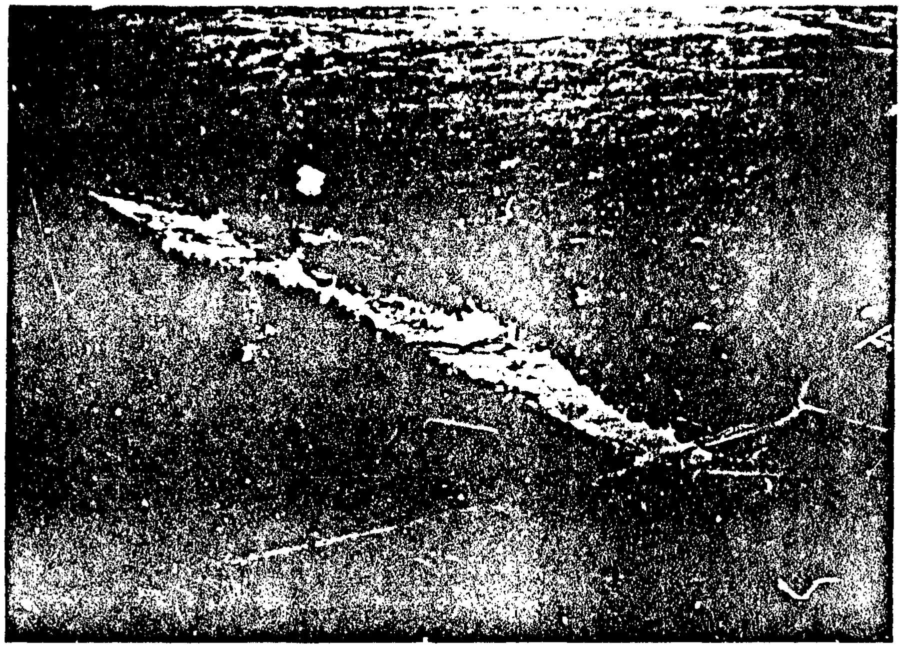

Figure 11. Station 8--Savannah River at South Carolina State Highway 181 Bridge (Upstream View)--November 20, 1980

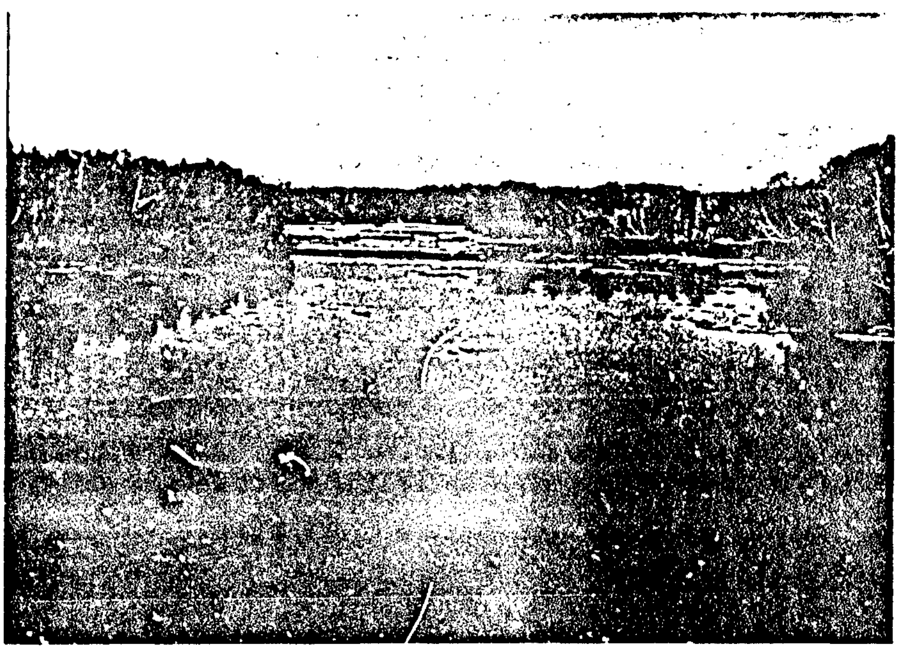

Figure 12. Station 8--Savannah River View Looking Upstream from South Carolina State Highway 181 Bridge--November 20, 1980

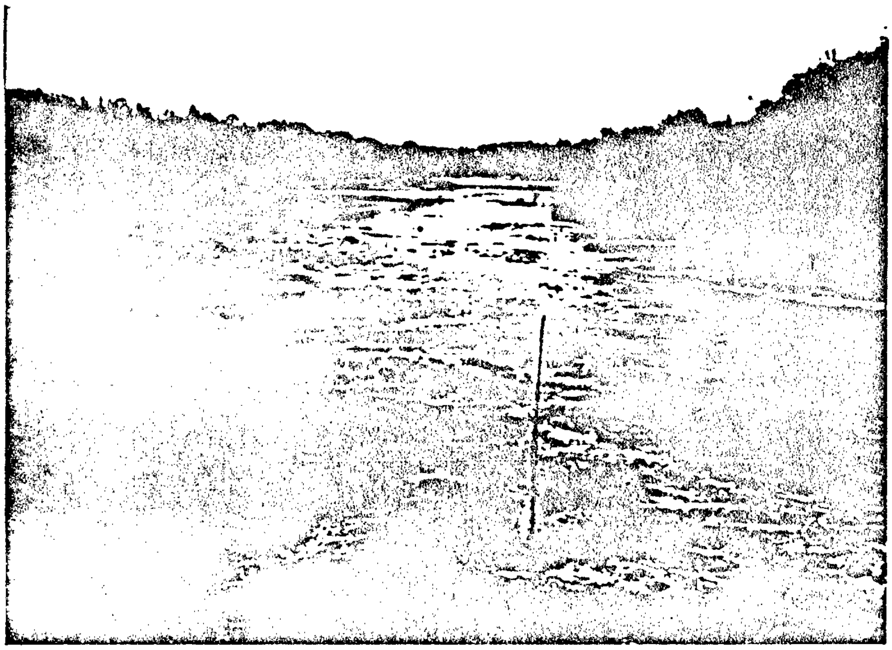

Figure 13. Station 8--Savannah River View Looking Downstream from South Carolina State Highway 181 Bridge--November 20, 1980

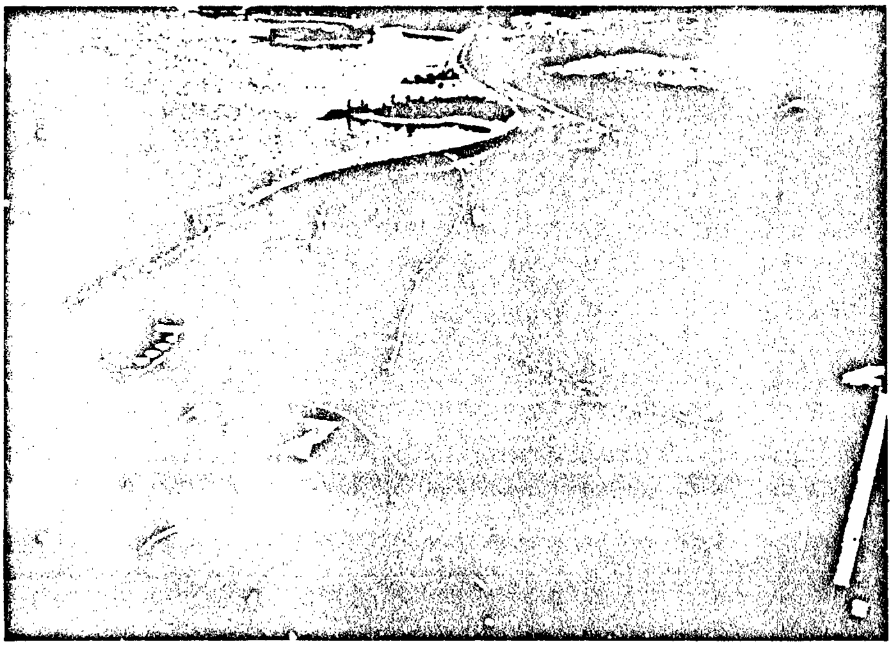

Figure 14. Station 10--Savannah River Just Downstream of Hartwell Dam--November 20, 1980

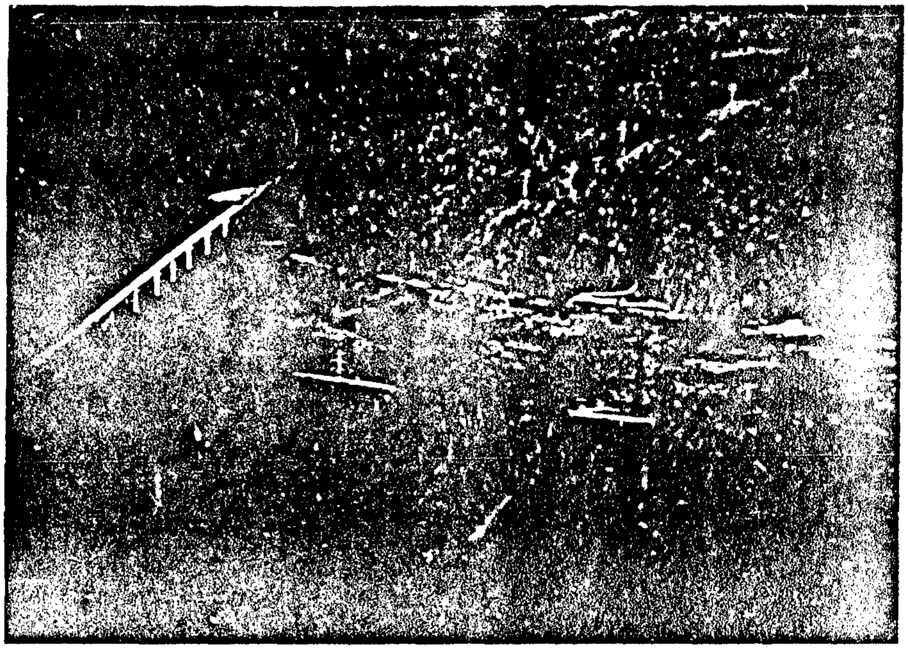

Figure 15. Station 10--Savannah River Downstream of U.S. Highway 29 Bridge (left side of photo) During Period When No Water Was Being Discharged from Hartwell Dam for Power Generation--November 20, 1980

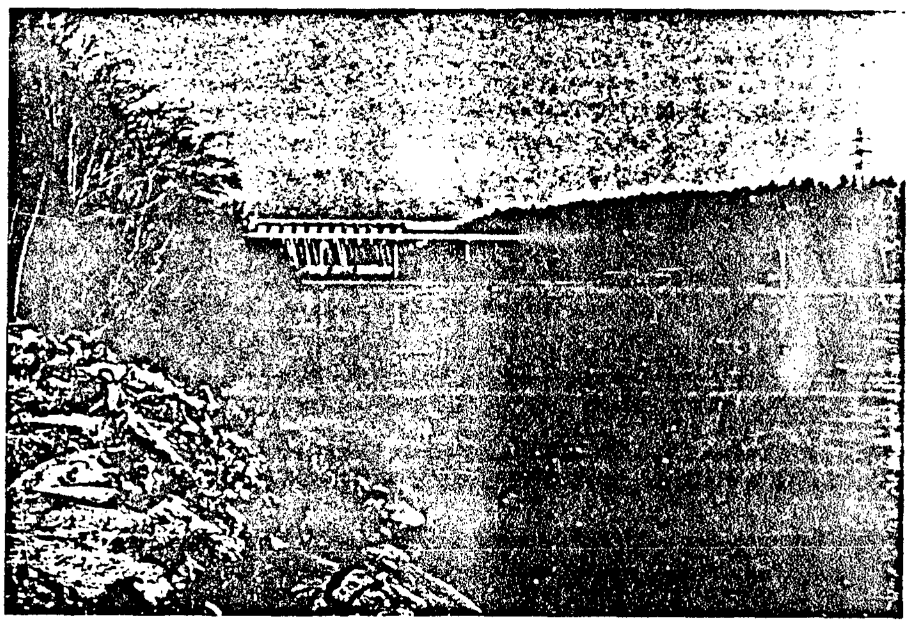

Figure 16. Station 10--Savannah River View Looking Upstream Toward U.S. Highway 29 Bridge and Hartwell Dam During Period When Water Was Being Discharged from Hartwell Dam for Power Generation--January 15, 1981

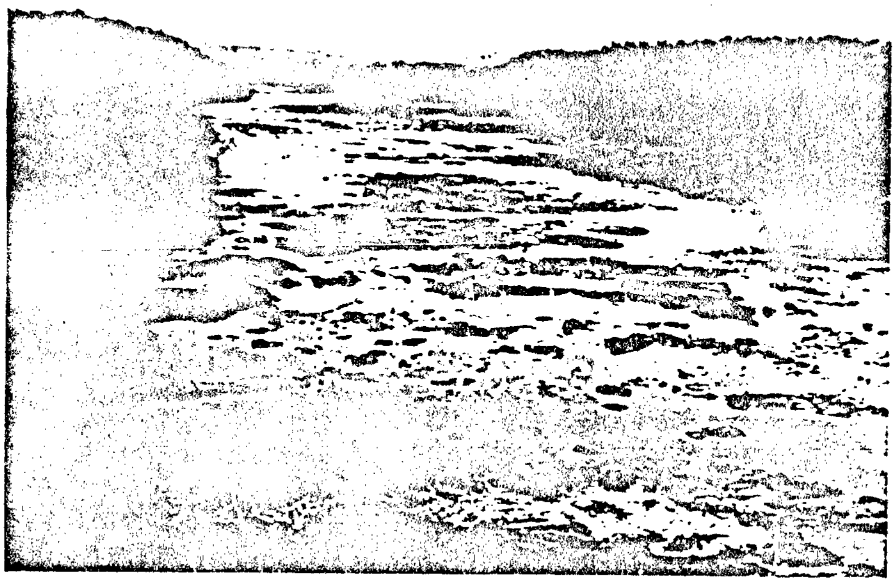

Figure 17. Station 10--Savannah River View Looking Downstream from U.S. Highway 29 Bridge During Period When No Water Was Being Discharged from Hartwell Dam for Power Generation--November 20, 1980

Figure 18. Station 3--Rocky River View Looking Upstream from Abbeville County Road 64 Bridge During Period When Water Level Was Low (sandbar exposed)--January 14, 1981

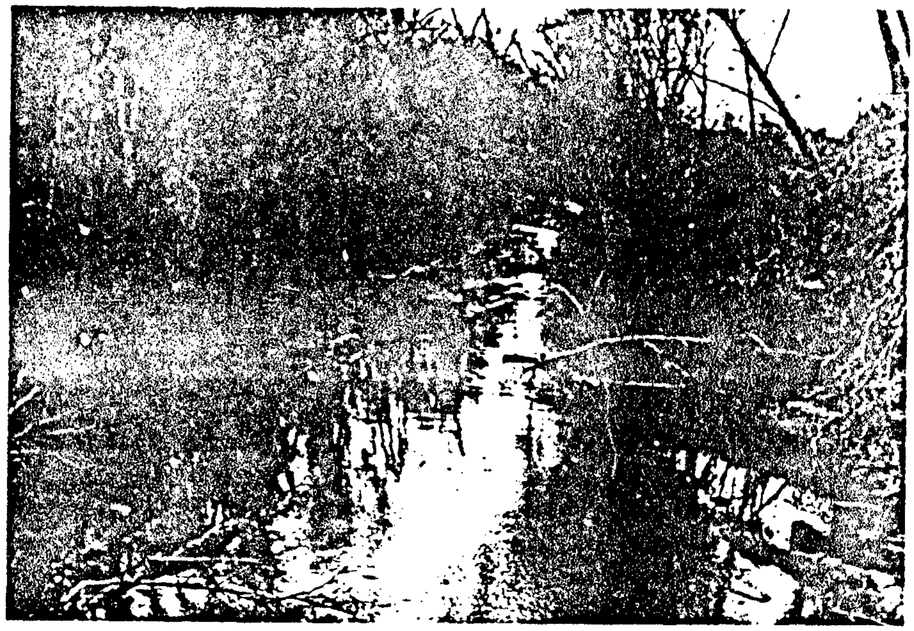

Figure 19. Station 3--Rocky River View Looking Downstream from Abbeville County Road 64 Bridge During Period When Water Level Was Low (no water being discharged from Secession Lake Dam)--January 14, 1981

Figure 20. Station 3--Rocky River View Looking Downstream from Abbeville County Road 64 Bridge Following the 7.1-Centimeter Rainfall on February 10 and 11, 1981--February 11, 1981

Figure 21. Station 4--Beaverdam Creek View Looking Upstream from Bridge at Station--January 13, 1981

Figure 22. Station 4--Beaverdam Creek Approximately 50 Meters Downstream of Bridge at Station (Downstream View)--January 13, 1981

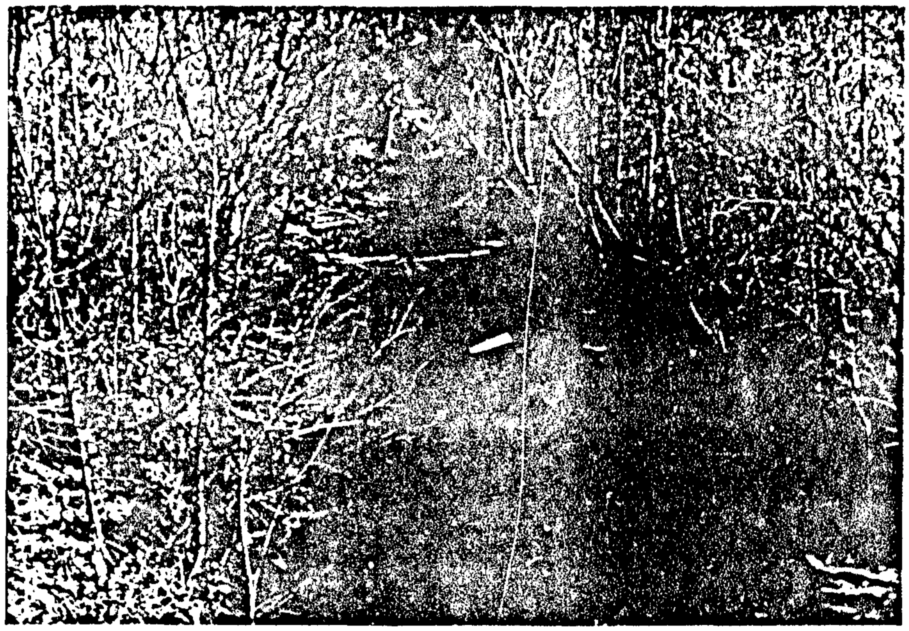

Figure 23. Station 4--Beaverdam Creek View Looking Downstream from Bridge at Station With Normal Water Flow Present--January 13, 1981

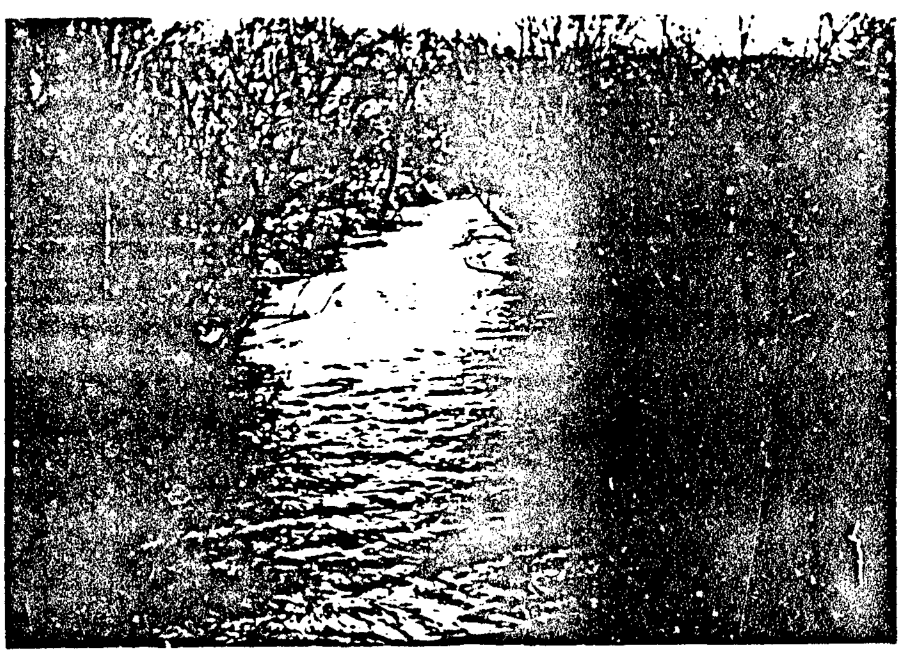

Figure 24. Station 4--Beaverdam Creek View Looking Downstream from Bridge Following the 7.1-Centimeter Rainfall on February 10 and 11, 1981--February 11, 1981

Figure 25. Station 5--Coldwater Creek View Looking Upstream from Elbert County Road 985 Bridge--November 20, 1980

Figure 26. Station 5--Coldwater Creek View Looking Downstream Toward Elbert County Road 985 Bridge--November 20, 1980

Figure 27. Station 7--Little Generostee Creek View Looking Upstream from Bridge on Extension of South Carolina State Highway 187--January 14, 1981

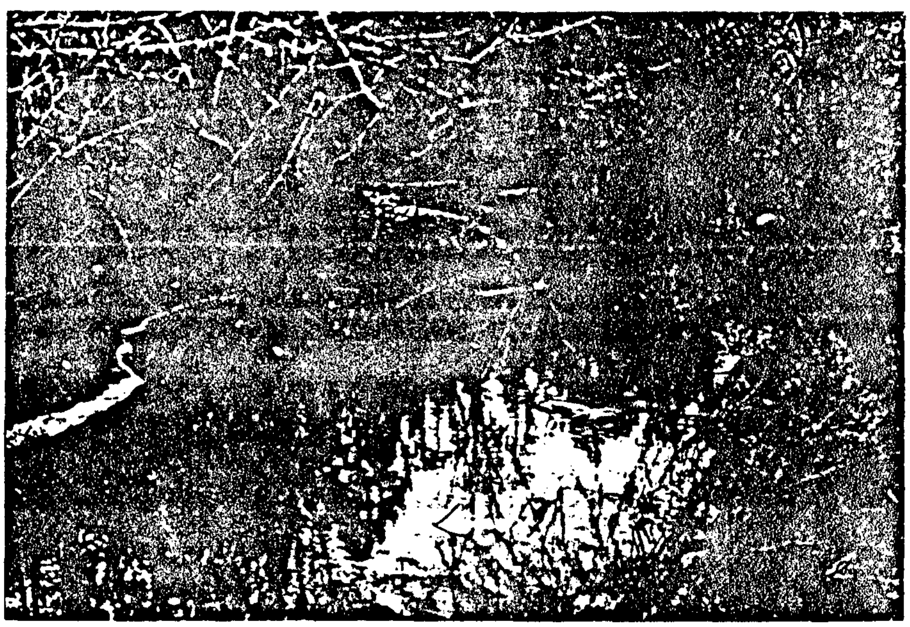

Figure 28. Station 7--Little Generostee Creek View Looking Downstream from Bridge on Extension of South Carolina State Highway 187--January 14, 1981

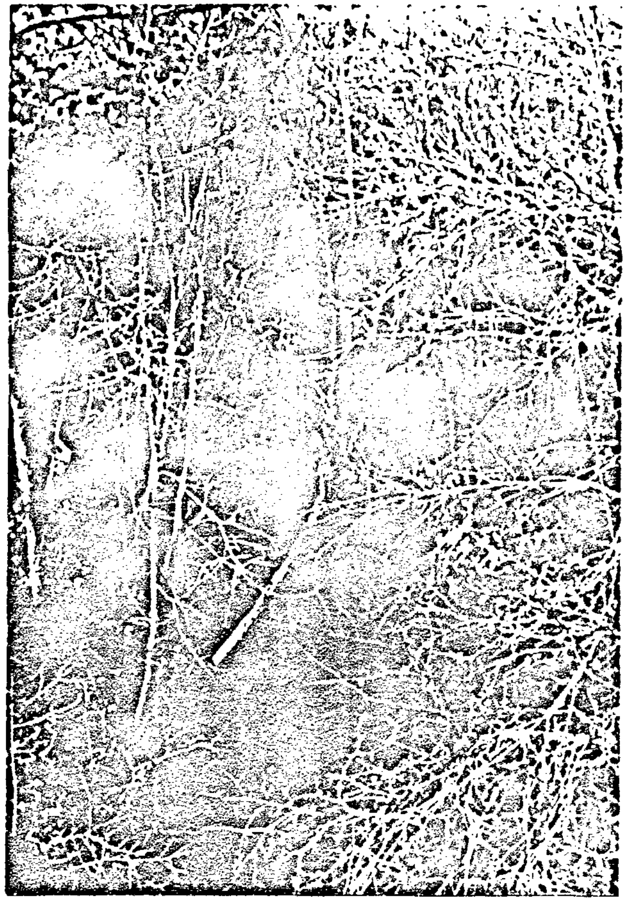

Figure 29. Station 9--Cedar Creek View Looking Upstream from Bridge on Georgia Highway 77 Spur--January 14, 1981

Figure 30. Station 9--Cedar Creek View Looking Downstream from Bridge on Georgia Highway 77 Spur--November 20, 1980

Figure 31. Station 11--Downstream of the Bigelow-Sanford Carpet Factory Discharge (water color was green)--July 15, 1981

Figure 32. Station 12--Upstream of the Bigelow-Sanford Carpet Factory Discharge (water color was slightly reddish-brown due to silt and clay in the water)--July 15, 1981

Table 5. Richard B. Russell Preimpoundment Study—Vascular Flora Observed Near Water Quality Sampling Stations

Common Name	Species Name
Trees and Woody Shrubs	
Loblolly Pine	Pinus taeda
Black Willow	Salix nigra
Eastern Red Cedar	Juniperus virginiana
Box Elder	Acer negundo
Red Maple	A. rubrum
Sugar Maple	A. saccarinum
Sweetgum	Liquidambar straciflua
Sycamore	Platanus occidentalis
White Ash	Fraxinus americana
Green Ash	F. pennsylvanica
Alder	Alnus serrulata
River Birch	Betula nigra
White Oak	Quercus alba
Southern Red Oak	Q. falcata var. falcata
Cherrybark Oak	Q. falcata var. pagodaefolia
Water Oak	Q. nigra
Willow Oak	Q. phellos
Red Oak	Q. rubra
Post Oak	Q. stellata
Bitternut Hickory	Carya cordiformis
Pignut Hickory	C. glabra
Mockernut Hickory	C. tomentosa
Walnut	Juglans nigra
Black Cherry	Prunus virginiana
Blackgum	Nyssa sylvatica
Hackberry	Celtis occidentalis
Winged Elm	Ulmus alata

Table 5. Richard B. Russell Preimpoundment Study—Vascular Flora Observed Near Water Quality Sampling Stations (Continued, Page 2 of 4)

Common Name	Species Name
Trees and Woody Shrubs (Continued)	
American Elm	U. americana
American Holly	Ilex opaca
Persimmon	Diospyros virginiana
Tulip Poplar	Liriodendron tulipifera
Basswood	Tilia americana
American Beech	Fagus grandiflora
Hophornbeam	Ostrya virginiana
Ironwood	Carpinus caroliniana
Dogwood	Carnus florida
Stiffcornel Dogwood	Cornus stricta
Sourwood	Oxydendrum arboreum
Red Mulberry	Morus rubra
Redbud	Cercis canadensis
Black Locust	Robinia pseudo-acacia
Indigo-Bush	Amorpha fruiticosa
Buttonbush	Cephalanthus occidentalis
Elderberry	Sambucus canadensis
Leucothoe	Leucothoe populifolia
Mountain Laurel	Kalmia latifolia
Wild Azalea	Rhododendron sp.
Tree Sparkleberry	Vaccinium arboreum
Blueberry (2 species)	V. spp.
Privet	Ligustrum japonicum
Pawpaw	Asimina triloba
Sassafras	Sassafras albidum
Blue Haw	Viburnum rufidulum
Devil's-Walking-Stick	Aralia spinosa

Table 5. Richard B. Russell Preimpoundment Study—Vascular Flora Observed Near Water Quality Sampling Stations (Continued, Page 3 of 4)

Common Name	Species Name
Trees and Woody Shrubs (Continued)	
American Beautybush	Callicarpa americana
Tree-of-Heaven	Ailanthus altissima
Winged Sumac	Rhus copallina
Common Sumac	R. glabra
Poison Sumac	R. vernix
Vines	
Poison Ivy	Rhus radicans
Greenbrier	Smilax glauca
Cinnamon Vine	Dioscorea batatas
Passionflower	Passiflora incarnata
No Common Name	P. lutea
Crossvine	Anisosticus capreolata
Climbing Hydrangea	Decumaria barbara
Japanese Honeysuckle	Lonicera japonica
Trumpet Creeper	Campsis radicans
Muscadine	Vitis rotundifolia
Virginia Creeper	Parthenocissus quinquefolia
Partridgeberry	Mitchella repens
Herbs	
Meadow Selaginella	Selaginella apoda
Thelypteris Fern	Thelypteris sp.
Christmas Fern	Polystichum acrostichoides
Ebony Spleenwort	Asplenium platyneuron
Sedge	Carex sp.
River Oats	Chasmanthium latifolia
Common Uniola	Uniola latifolia

Table 5. Richard B. Russell Preimpoundment Study—Vascular Flora Observed Near Water Quality Sampling Stations (Continued, Page 4 of 4)

Common Name	Species Name
Herbs (Continued)	
Wild Bamboo	Arundinaria gigantea
Panic Grass	Panicum sp.
Soft Rush	Juncus effusus
Wild Onion	Allium sp.
Wild Ginger	Asarum canadense
Dayflower	Commelina sp.
Yellowroot	Xanthorhiza simplicissima
Downy Rattlesnake Plantain	Goodyera pubescens
Peppergrass	Lepidium virginicum
Smartweed (2 species)	Polygonum spp.
Impatiens, Balsam	Impatiens balsamina
Curly Dock	Rumex crispus
Plantain	Plantago virginica
Water Hemlock	Cicuta maculata
Violet	Viola floridana
Ironweed	Sida acuta
False Nettle	Boehmeria cylindrica
Liverleaf	Hepatica americana
Blackberry	Rubus penetrans
Dewberry	R. trivialis
Partridgepea	Cassia fasciculata
Horseweed	Conyza canadensis
Joe Pyeweed	Eupatorium fistulosum
Dog Fennel	E. capillifolium
Ragweed	Ambrosia artemisiifolia
Fleabane Daisy	Erigeron vernuus

Source: WAR, 1981.

Stations 1 and 2--In the southern portion of the study area, the Savannah River's riverbed is approximately 300 meters wide at Stations 1 and 2 (Figures 3-7). Extensive construction is taking place at both of these sampling locations. Station 1 is located just downstream of the Richard B. Russell Dam site. Station 2 is located just upstream of the new Georgia State Highway 72 bridge construction site and downstream of the new Seaboard Coast Line railroad bridge construction site. At both of these sampling locations (Stations 1 and 2) sand is the predominant sediment type. This is partially due to the erosion near the construction sites upstream of the stations and also to the decreased water velocity (particularly at Station 1 which is located essentially in the upper portion of Clark Hill Lake). The resultant sandbars generally had little vegetation (<5-percent cover), due to the fluctuating water levels, although some vegetation occurred on the large sandbar on Savannah River's east bank just downstream of the Richard B. Russell Dam site. This vegetation mostly consisted of annual herbaceous species such as horseweed (Conza canadensis), ironweed (Sida acuta), and grasses (Poaceae). River birch (Betula nigra) and black willow (Salix nigra) also occurred on the large sandbar.

The excessive accumulation of sands at Stations 1 and 2 has severely stressed aquatic vegetation and associated macroinvertebrate and fish populations within the river. The sands have buried most of the rocks and their attached algal and moss communities, and scour from suspended sediments appears to have reduced the vigor and productivity of the aquatic plants which remain.

Along the streambanks at Stations 1 and 2, the abovementioned herbaceous species also were present along with indigo-bush (Amorpha fruiticosa), shining sumac (Rhus copallina), alder (Alnus serrulata), and a number of vine species. The adjacent uplands consisted of mixed pine and hardwood forests, with approximately 90-percent canopy cover. The dominant trees consisted of post oak, mockernut hickory, sweetgum, blackgum, white oak, red oak, red maple, loblolly pine, and dogwood.

Stations 6, 8, and 10--In the northern half of the study area, the Savannah River is only about 150 to 200 meters wide at Stations 6, 8, and 10 (Figures 8-17). There are fewer sandbars and more areas of exposed bedrock present in this portion of the Savannah River. Aquatic vegetation is more abundant at Stations 6 and 8, since there is less shifting sand. However, at Station 10 aquatic vegetation is almost completely absent due to the large variations in water velocity and temperature at this station. When power is generated at Hartwell Dam, large volumes of cold water are discharged downstream at high (scouring) speeds. When the generators are shutdown, there is almost no flow at this station and the ponded water temperature rises due to isolation. This combination of high velocity water and large temperature flucuations would severely stress any aquatic plants present at Station 10.

Streamside vegetation was relatively more dense at Stations 6, 8, and 10 than at the other Savannah River stations. Although logging had removed the streamside forest at Stations 6 and 8 (25-percent cover), there were dense growths of shrub, grass, and herbaceous species which prevented significant erosion. Streamside vegetation at Station 10 has a good tree canopy (75-percent cover) since it is within a park and remains unlogged. This tree canopy supports sycamore, river birch, black willows, green ash, water oak, hackberry, and others. Shrubs were dense and consisted of tree sparkleberry, two kinds of blueberry, wild azalea, mountain laurel, leucothoe, elderberry, and buttonbush. In places, the streambanks were covered with a carpet of Selaginella, mosses, liverworts, Christmas fern, and other herbaceous species.

The upland forests at Stations 6, 8, and 10 are similar to those at Stations 1 and 2, but are more diverse. Canopy cover was about 95 percent and the forest in the park at Station 10 is especially mature.

Station 3--At Station 3 on the Rocky River, water flow was also governed by power generation upstream of the station at Secession Lake and Dam. The river channel at this station was approximately 30 meters wide and

water levels fluctuated from approximately 0.5 meter when no power was being generated to over 1 meter during power generation periods (Figures 18-20). Sediments present at Station 3 consisted predominantly of coarse sand; no aquatic vegetation was observed in this harsh, shifting sand environment. In the vicinity of Station 3, the stream channel is a box cut with sides 4 to 6 feet in height. This provides habitat for only a few plants, including false nettle (Boehmeria cylindrica), river oats (Chasmanthium latifolia), and a low panic-grass (Panicum sp.).

Streamside vegetation at Station 3 occupies a floodplain which was recently logged. There are few large trees remaining, comprising less than 5-percent cover. These include sycamore, river birch, green ash, box elder, American elm, water oak, willow oak, and red maple. Shrubs and small trees include American holly, stiffcornel dogwood, and persimmon. Ground and vine cover is very dense and is almost impenetrable in places. These species include blackberry, joe pyeweed, dogfennel, curly dock, impatiens, two smartweeds, peppergrass, ragweed, muscadine, trumpet creeper, and Japanese honeysuckle. The uplands are in agricultural use or in young, planted loblolly pines (45- to 65-percent canopy cover).

Station 4--Station 4 (Figures 21-24) on Beaverdam Creek was located downstream of the bridge. An old, defunct textile mill was located adjacent to Beaverdam Creek in the vicinity of the station; however, most of the buildings have fallen down over the years. There was no evidence of any mill discharge or seepage which would have affected the water quality sampling at this station. The creek channel was approximately 30 meters wide and the sediment was coarse sand with some ripple areas of exposed rock present.

Aquatic vegetation was present but sparse. Herbaceous streamside vegetation was dense and diverse, due to the relatively open canopy resulting from logging. The vegetation was mostly wild bamboo and greenbrier. Other common species included river oats, false nettle, day flower, trumpet creeper, Japanese honeysuckle, and poison ivy. Trees present

included black willow, river birch, red maple, hackberry, and winged elm, and formed a 45- to 65-percent canopy cover.

The upland forests at Station 4 also have been recently logged. At the time of the field surveys, much of the upland soil was bare and heavily eroded. Track scars from logging equipment were extensive. Trees and shrubs were few and formed less than a 10-percent canopy cover. Ground vegetation was composed of Japanese honeysuckle, muscadine, and many herbaceous species.

Station 5--At Station 5 on Coldwater Creek (Figures 25-26), there was a small picnic area located on the upstream side of the bridge, but very little use of this area was observed during the study. At this sampling location (Station 5), the creekbed was approximately 14 meters wide and the sediments were shifting, coarse sands.

Small sandbars present at Station 5 supported a sparse flora which was probably washed away with every storm event. The species present consisted of false nettle, a low panic-grass, dayflower, and seedlings of sycamore and alder. No aquatic vegetation was observed.

Streamside vegetation at Station 5 supported a diversity of trees, although a large section of land had been cleared by the time of the July field survey. Dominant trees were sycamore, river birch, and water oak, with tulip poplar, ironwood, sweetgum, and stiffcornel dogwood common. Ground cover was dominated by Japanese honeysuckle, wild bamboo, and common uniola.

The upland at Station 5 was forested (approximately 90-percent canopy coverage) in mixed pine and hardwoods, being dominated by red oak, white oak, loblolly pine, red maple, several hickories, and dogwood. A large section of land had been cleared to the subsoil by construction activities, and erosion was significant.

Station 7--Of the creeks sampled during this study, Little Generostee Creek (Station 7) (Figures 27-28) had the greatest diversity of aquatic habitats. The creek is approximately 15 meters wide and has a diversity of aquatic habitats including: (1) shallow, rocky ripple areas; (2) gently flowing portions with coarse sand substrate; (3) ledges and small rapid areas literally covered with mosses; and (4) pooled areas, some of which are 2 meters deep. During the summer, Station 7 areas are used substantially for fishing, family outings, and some swimming. During July, construction for the new bridge was taking place just upstream of the present structure, and involved land clearing/moving on both sides of the creekbed for the establishment of a higher roadbed across the creek. A small (<0.5 meter), temporary rock dam also had been constructed to provide a pooled area from which water could be pumped for use in wetting down the new roadbed. However, water quality sampling was performed upstream of this construction area and should not have been affected.

Streamside vegetation at Station 7 was dominated by the typical community of sycamore, river birch, black willow, alder, wild bamboo, and vines. Also common were sweetgum, red maple, shining sumac, mountain laurel, and Christmas fern.

In the upland areas of Station 7, erosion was significant in the areas being cleared to subsoil for the new roadbed. The vegetation being cleared consisted of mixed upland hardwoods and loblolly pine. In upland areas outside of this construction area, the canopy coverage varied considerably due to the recreational and cultural activities in the area. In the infrequently used locations with intact forests, the canopy coverage was 85 to 95 percent.

Station 9--At Cedar Creek (Station 9) there is one house located on the north side of the Georgia State Highway 77 Spur Bridge on a hillside overlooking the creek. Although the actual effect is probably very minimal, this house could potentially affect the water quality at Station 9 due to runoff, the septic tank system, or the dogs in the yard which

have free access to the creek. The creekbed is <15 meters wide and the water shallow (Figures 29-30). The substrate is primarily shifting sand and supports no aquatic vegetation.

Streamside vegetation at Station 9 supports river birch, water oak, Christmas fern, wild ginger, partridgeberry, leucothoe, and yellowroot. This community occupies a very narrow zone flanking the stream, and is itself dominated by the upland forest with which it intergrades.

The upland forest at Station 9 supports loblolly pine, mockernut and pignut hickories, oaks (white, water, cherrybark, red, and southern red), cedar, red maple, sweetgum, dogwood, sourwood, ironwood, red mulberry, white ash, and American holly. The shrub cover was sparse and consisted of mountain laurel, tree sparkleberry, and tree saplings. Partridgeberry, downy rattlesnake plantain, and a thelypteris fern comprised the ground cover. Vines were abundant. Canopy cover for the streamside and upland forest was 85 to 95 percent.

Stations 11 and 12--Station 11 was located downstream of the Bigelow-Sanford Carpet Factory discharge and Station 12 was added in July just upstream of this discharge. The streambed at these locations was <2 meters wide and generally <0.3 meter deep (Figures 31-32). Downstream of the carpet factory discharge, the water was stained a dark color due to the presence of dye in the water (see section Results, Water Quality). Upstream of the carpet factory discharge, the water was only slightly turbid due to the presence of suspended clay in the water. Portions of the stream were rocky and others had a silt-clay substrate. The rocks had some mosses and algae on them, but the plants were probably being stressed due to the dye and silt-clay load.

Streamside vegetation at Stations 11 and 12 was sparce and was dominated by the upland forest. It was comprised mostly of leucothoe, elderberry, Christmas fern, and false nettle.

The upland forest was dominated by loblolly pines and mixed hardwoods. Much of this area was in planted loblolly pine plantations with about 25- to 40-percent canopy cover. Cover in the mixed forest was very dense, generally being over 95 percent.

Stream Flows

Data was obtained from the U.S. Geological Survey (USGS) in Columbia, South Carolina for water gage levels on the Savannah River near Calhoun Falls, South Carolina (USGS Station No. 02189000) and near Iva, South Carolina (USGS Station No. 02187500). The locations of the water gaging stations are shown in Figure 1 (see section Methods and Techniques). Flow data at the Calhoun Falls station is no longer accurate due to alteration of the river channel during construction of the new Georgia State Highway 72 bridge. Therefore, only the mean gage height data is available for this station. Appendix A contains a summary of the available flow data for the study area. Monthly average flows for January through July at the Iva Station are listed in Appendix A, Table A-1. Daily average gage heights at both stations are also listed for 1 week prior to and the week of each water quality sampling period (Table A-2). Table A-3 presents the monthly average discharge rates from Hartwell Dam for 7 years prior to this study. From this table (Table A-3), it is evident that there is no consistent trend in mean monthly stream flow data for the Savannah River. The flow in the river is primarily dependent on the power generation demands at the Hartwell Dam generating station.

On a daily basis, however, a chronological trend can be determined from the data shown in Table A-2. Since power is not usually generated at Hartwell Dam during the weekends, flow in the river is greatly reduced. Monday through Friday the flow in the river is greater due to the large volume of water released during power generation. Although the effects of the 7.1-cm rainfall in February (Table A-4) were visually very apparent in the Savannah River (due to increased turbidity), the rise in water level was masked by the normal increases during power generation.

In the tributaries, however, increases in both turbidity and water level were visually very apparent.

Water Quality

Complete meteorological, in situ, and laboratory water quality results for the Savannah River and its tributaries are presented in Appendices B and C. In situ and water quality sampling was performed at each of the designated stations on February 9, 11, and 13 and July 13, 15, and 17. Sampling during February was representative of cold temperatures and high flow conditions (caused by a storm event with 7.1 cm of rainfall on February 10 and 11). Sampling during July was representative of warm temperatures and low flow conditions. In addition, a diel (diurnal plus nocturnal) study was conducted (Stations 2, 3, 4, and 10 on July 16 and 17) with sampling at 3-hour intervals for 24 hours. The diel sampling was not performed in February due to the heavy rainfall in the area on February 10 and 11. The rainfall caused high water levels and suspended solid loads within the Savannah River and its tributaries (due to excessive watershed runoff), which would have masked any changes in water quality during a diel study. Also, due to the low (near 0°C) temperatures, high dissolved oxygen levels (approaching or above saturation), and high stream flows present in February, one would not expect significant nocturnal/diurnal-type changes to occur in the water quality of the Savannah River and its stream environments.

Generally, the water quality of the Savannah River and its tributaries within the study area is of good quality. Results of the field sampling and water quality sampling presented in Appendices B and C are summarized in Tables 6 and 7, respectively, which list the ranges and means at each station for each of the parameters analyzed in February and July. The primary factors accounting for the variability found during the February and July sampling periods would be the:

1. Seasonal changes,
2. Heavy rainfall (7.1 cm) during the February sampling,

Table 6. Richard B. Russell Preimpoundment Study—Summary of Field Data For Savannah River and Tributary Stations Collected February 9, 11, and 13 and July 13, 15, and 17, 1981

February Parameter (Units)	Savannah River Stations									
	Station 1		Station 2		Station 6		Station 8		Station 10	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
METEOROLOGICAL										
Air Temperature (°C)	4.5-13	8.8	5-16	9.3	(-2)-10	4	2-19	8.7	2-11	5.7
HYDROLOGICAL										
Secchi Disc Transparency (meters)*	-	1.5	-	-	.05-1.5	.78	-	>2	>1->1.5	>1.3
Depth of 1-Percent Surface Light (meters)*	.5-2.8	>1.6	<.5->1.5	>1	-	>2.8	-	>2	-	>2
IN SITU PARAMETERS										
Water Temperature (°C)	5-8	6	3-8	5	4-7.5	5.9	4.5-6.8	5.8	5.5-6	5.8
Specific Conductance (umhos/cm 25°C)	35-42	39	40-46	43	31-34	32	29-30	30	28-31	30
Dissolved Oxygen, Electrode (mg/l)	12-12.9	12.3	11.4-12.9	12.2	11.9-12.8	12.4	12.3-14.3	13.0	12.2-12.8	12.5
Dissolved Oxygen (percent saturation)	94-101	97	92-98	95	96-103	99	95-115	104	97-103	100
pH (standard units)	5.6-6.7	6.2	5.8-6	5.9	5.7-6.2	6.0	5.5-5.8	5.7	3.5-6.1	5.0
Oxidation Reduction Potential (mv)	494-619	1,710	478-621	572	475-548	506	452-528	495	523-669	605

* > indicates value (or mean including a value) greater than the total depth.

Table 6. Richard B. Russell Preimpoundment Study—Summary of Field Data For Savannah River and Tributary Stations Collected February 9, 11, and 13 and July 13, 15, and 17, 1981
(Continued, Page ? of 4)

February Parameter (Units)	Tributary Stations											
	Station 3		Station 4		Station 5		Station 7		Station 9		Station 11	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
METEOROLOGICAL												
Air Temperature (°C)	6-17	14	6-15	9.7	(-3)-7	2.7	(-1)-16	7.5	1-15	6.3	-	2.0
HYDROLOGICAL												
Secchi Disc Transparency (meters)*	-	-	-	>.5	.05-.3	.18	.05->.5	>.28	.05-.5	.28	-	-
Depth of 1-Percent Surface Light (meters)*			.5-1.0	>.37	-	>.4	-	>.4	-	>.4	-	.3
IN SITU PARAMETERS												
Water Temperature (°C)	3-8	5	3-7.5	4.8	.9-6.5	3.7	1.2-6.5	3.5	2-6	3.5	-	1
Specific Conductance (umhos/cm 25°C)	40-55	46	40-58	49	30-38	34	40-43	41	39-58	47	-	148
Dissolved Oxygen, Electrode (mg/l)	11.8-13.4	12.6	12.4-13.5	13.0	12-13.9	13.2	12.4-15.0	13.7	11.2-14.1	12.7	-	>15
Dissolved Oxygen (percent saturation)	93-102	98	98-103	101	97-105	100	98-111	103	90-103	95	-	>105
pH (standard units)	5.6-5.9	5.8	5.5-6.0	5.7	5.3-5.9	5.6	4.3-6.1	5.2	4.4-6.0	5.3	-	6.1
Oxidation Reduction Potential (mv)	465-602	538	530-592	571	407-586	474	437-497	476	538-588	559	-	459

* > indicates value (or mean including a value) greater than the total depth.

Table 6. Richard B. Russell Preimpoundment Study—Summary of Field Data For Savannah River and Tributary Stations Collected February 9, 11, and 13 and July 13, 15, and 17, 1981
(Continued, Page 3 of 4)

July Parameter (Units)	Savannah River Stations									
	Station 1		Station 2		Station 6		Station 8		Station 10	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
METEOROLOGICAL										
Air Temperature (°C)	29-31	30.7	27-36	31	31-35	33.3	30-32	31.2	24-28.5	26.2
HYDROLOGICAL										
Secchi Disc Transparency (meters)*	.2->1	>.7	.5->1.5	>1.0	>3->3.2	>3.1	>.6->1.0	>.87	-	1
Depth of 1-Percent Surface Light (meters)*	-	1.7	-	>1.0	-	-	-	-	-	-
IN SITU PARAMETERS										
Water Temperature (°C)	14-24	19	17-27	21	14-22	17	15-21.5	17.3	13-15.5	14.2
Specific Conductance (umhos/cm 25°C)	37-76	51	46-53	50	32-43	39	46-56	52	38-40	39
Dissolved Oxygen, Electrode (mg/l)	7.4-10.2	6.9	7.5-9.1	8.5	5.4-7.2	6.2	6.0-8.0	7.0	6.5-8.5	7.3
Dissolved Oxygen (percent saturation)	87-98	94	93-96	94	59-71	64	59-80	73	65-80	71
pH (standard units)	5.4-7.4	6.4	6.0-7.4	6.5	6.2-6.7	6.5	6.4-7.6	6.9	5.9-6.7	6.3
Oxidation Reduction Potential (mv)	442-596	527	505-588	535	483-617	561	487-641	574	575-607	588

* > indicates value (or mean including a value) greater than the total depth.

Table 6. Richard B. Russell Preimpoundment Study—Summary of Field Data For Savannah River and Tributary Stations Collected February 9, 11, and 13 and July 13, 15, and 17, 1981 (Continued, Page 4 of 4)

July Parameter (Units)	Tributary Stations													
	Station 3		Station 4		Station 5		Station 7		Station 9		Station 11		Station 12	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
METEOROLOGICAL														
Air Temperature (°C)	27-35	31	25-27.5	26.2	30-34	31.7	-	31	27-30	28.8	-	31	-	31
HYDROLOGICAL														
Secchi Disc Transparency (meters)*	>.7-1.4	>1.0	.3->.5	>.37	>.2->.3	>.23	>.3->.5	>.37	>.3->.5	>.37	-	>.2	-	.3
Depth of 1-Percent Surface Light (meters)*	-	>.7	-	-	-	-	-	-	-	-	-	-	-	-
IN SITU PARAMETERS														
Water Temperature (°C)	21.5-23	22.3	25-26	25.5	25-26	25.7	23-25	24.2	23-24	23.7	-	25	-	23
Specific Conductance (umhos/cm 25°C)	68-75	70	85-109	94	40-49	46	57-60	59	66-72	69	-	265	-	151
Dissolved Oxygen, Electrode (mg/l)	7.0-7.6	7.3	6.7-7.0	6.9	5.7-7.9	6.9	5.4-7.7	6.2	5.2-5.8	5.6	-	7.1	-	8.1
Dissolved Oxygen (percent saturation)	80-88	83	80-85	83	69-94	83	63-92	73	60-88	65	-	85	-	93
pH (standard units)	6.1-7.6	6.7	6.4-6.9	6.6	5.5-6.8	6.3	6.7-6.9	6.8	6.4-6.8	6.6	-	6.8	-	7.4
Oxidation Reduction Potential (mv)	499-587	535	444-585	511	484-589	553	461-615	554	446-597	546	-	415	-	412

* > indicates value (or mean including a value) greater than the total depth.

Table 7. Richard B. Russell Preimpoundment Study--Summary of Water Quality and Bacteriology Data For Savannah River and Tributary Stations
Collected February 9, 11, and 13 and July 13, 16, and 17, 1981

February Parameters (Units)	Savannah River Stations									
	Station 1		Station 2		Station 6		Station 8		Station 10	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
PHYSICAL DATA										
Color (Pt-Co units)	24-160	84	22-150	88	7-38	25	2-16	9.2	5-16	9.8
Turbidity, Hach Turbidimeter (FTU)	7-140	55	5-340	116	2-39	15	2-4	2.7	2-3	2.7
Total Nonfilterable Residue (mg/l)	5-120	48	<5-360	<130	<5-79	<30	-	<5	-	<5
CHEMICAL DATA										
MINERALS AND METALS										
Alkalinity, Total (mg $CaCO_3$/l)	18-29	22	22-31	27	13-20	17	7-17	13	13-18	15
Chloride (mg Cl/l)	1.8-3	2.3	1.8-3.2	2.8	1.2-1.7	1.5	1.2-1.4	1.3	1.1-1.5	1.3
Calcium, Total (mg Ca/l)	1.8-2.9	2.4	2.5-3.7	3.1	1.4-1.7	1.6	1.3-2.1	1.7	1.1-2.4	1.6
Hardness, Total (mg $CaCO_3$/l)	12-18	14	12-24	17	7-13	10	7-10	8.6	5-10	7.8
Iron, Dissolved (mg Fe/l)	<.2-1.1	<.47	<.2-1.3	<.53	-	<.2	-	<.2	-	<.2
Iron, Total (mg Fe/l)	.38-8.7	2.9	.25-17	6.0	<.2-4.5	<1.4	<.2-.36	<.23	<.2-.31	<.24
Manganese, Dissolved (mg Mn/l)	-	<.05	-	<.05	-	<.05	-	<.05	-	<.05
Manganese, Total (mg Mn/l)	<.05-.17	<.09	<.05-.52	<.21	<.05-.37	<.12	-	<.05	-	<.05
Potassium, Total (mg K/l)	1.3-1.8	1.6	1.6-3.1	2.2	.77-3.3	1.4	.86-4.7	1.7	.55-1.4	.99
Sodium, Total (mg Na/l)	2.8-4.1	3.3	3.3-4.4	4.0	2.2-2.6	2.4	-	2.4	2.3-2.4	2.4
NUTRIENTS										
Carbon, Total Organic (mg C/l)	1.5-6.0	3.1	2.0-6.0	3.5	1.0-2.5	1.8	1.0-2.0	1.6	1.0-2.0	1.3
Free Carbon Dioxide (mg CO_2/l)	21-68	38	31-47	37	11-75	37	19-55	31	27-62	43
Nitrogen, Total Ammonia (mg N/l)	.021-.079	.050	.019-.055	.033	.021-.064	.034	.006-.033	.023	<.005-.099	<.034
Nitrogen, Nitrate + Nitrite (mg N/l)	.11-.24	.19	.17-.28	.21	.12-.18	.12	.067-.18	.13	.074-.17	.12
Nitrogen, Dissolved TKN (mg N/l)	<.25-.42	<.30	-	<.25	-	<.25	-	<.25	-	<.25
Nitrogen, Total Kjeldahl (mg N/l)	<.25-.45	<.30	<.25-.34	<.28	<.25-.27	<.25	-	<.25	-	<.25
Orthophospate, Dissolved (mg P/l)	.004-.050	.031	.007-.062	.025	.002-.013	.006	.002-.007	.004	.002-.003	.002
Phospate, Ortho (mg P/l)	.003-.046	.030	.003-.055	.025	<.002-.024	<.009	<.002-.008	<.004	<.002-.004	<.003
Phosphate, Total (mg P/l)	.021-.29	.13	.023-.52	.21	.008-.29	.090	<.002-.011	<.008	.002-.009	.006
DEMAND GROUP										
BOD, 5-day, 20°C (mg/l)	1-3	2	1-4	2.3	<1-3	<1.7	<1-2	<1.3	<1-2	<1.3
COD (mg/l)	2.5-17	8.0	6-23	13	0.5-7.6	4.2	1.5-4.9	2.8	2-5.1	3.9
BIOLOGICAL DATA										
BACTERIOLOGICAL DATA										
Fecal Coliform (#/100 ml)	<1-620	<220	9-490	190	<1-470	<140	<1-4	<1.8	<1-8	<2.7
Total Coliform (#/100 ml)	420-4,700	2,550	1,100-7,000	4,530	62-12,000	3,770	<1-17	<6.8	<1-9	<3.2
Fecal Streptococci (#/100 ml)	2-10,000	3,300	9-6,100	2,000	2-11,000	3,580	<1-20	<7.2	5-26	13
BIOMASS MEASUREMENTS										
Chlorophyll-a (mg/l)	1.9-4.8	3.3	5.1-6.6	6.1	1.4-4.9	2.6	.61-1.9	1.2	.70-1.6	1.2

Table 7. Richard B. Russell Preimpoundment Study—Summary of Water Quality and Bacteriology Data For Savannah River and Tributary Stations Collected February 9, 11, and 13 and July 13, 16, and 17, 1981 (Continued, Page 2 of 4)

	Tributary Stations											
	Station 3		Station 4		Station 5		Station 7		Station 9		Station 11	
February Parameter (Units)	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
PHYSICAL DATA												
Color (Pt-Co units)	20-170	91	65-280	163	50-240	153	39-240	117	55-160	98	-	440
Turbidity, Hach Turbidimeter (FTU)	7-220	78	9-390	155	6-400	135	5-270	97	7-180	69	37-38	38
Total Nonfilterable Residue (mg/l)	11-430	149	<5-610	<227	<5-650	<219	<5-500	<162	6-260	95	-	24
CHEMICAL DATA												
MINERALS AND METALS												
Alkalinity, Total (mg $CaCO_3$/l)	19-33	27	13-31	22	7-18	13	7-27	18	7-23	15	-	39
Chloride (mg Cl/l)	2.6-3.8	3.3	2.2-7.7	5.0	1.6-2.2	1.9	2.1-2.6	2.4	1.9-3.3	2.7	8.1-8.2	8.2
Calcium, Total (mg Ca/l)	2.7-3.1	3.0	1.9-3.5	2.9	1.4-1.9	1.7	2.1-2.5	2.3	1.7-2.0	1.8	6.7-6.9	6.8
Hardness, Total (mg $CaCO_3$/l)	14-20	17	11-29	18	10-18	13	14-22	17	9-18	15	30-35	33
Iron, Dissolved (mg Fe/l)	-	<.2	<.2-1.5	<.70	<.2-.60	<.31	<.2-.45	<.28	<.2-1.8	<.55	.9-1.2	1.1
Iron, Total (mg Fe/l)	.23-18	6.1	.76-25	9.6	.5-20	7.3	<.2-29	<8.4	.86-16	4.8	1.2-1.4	1.3
Manganese, Dissolved (mg Mn/l)	-	<.05	<.05-.12	<.07	-	<.05	<.05-.06	<.05	<.05-.07	<.06	-	<.05
Manganese, Total (mg Mn/l)	<.05-.67	<.26	<.05-.58	<.27	<.05-.54	<.23	<.05-.49	<.19	<.05-.24	<.13	-	.10
Potassium, Total (mg K/l)	1.9-3.9	2.6	1.9-7.2	4.8	1.4-3.8	2.3	1.8-6.6	3.7	1.5-3.9	2.4	2.5-12	7.3
Sodium, Total (mg Na/l)	3.3-4.9	4.4	3.4-5.8	5.0	1.6-2.9	2.3	2.3-4.0	3.2	1.9-5.3	3.5	-	19
NUTRIENTS												
Carbon, Total Organic (mg C/l)	1.5-6.5	3.7	2.5-7.0	4.3	1.0-7.0	3.5	2.0-6.5	3.6	1.5-6.0	2.9	14-18	16
Free Carbon Dioxide (mg CO_2/l)	21-60	36	15-67	41	15-99	40	17-52	38	24-70	50	-	11
Nitrogen, Total Ammonia (mg N/l)	.028-.30	.12	.022-.19	.10	.033-.18	.093	.029-.35	.16	.15-.22	.18	-	1.8
Nitrogen, Nitrate + Nitrite (mg N/l)	.16-.37	.28	.24-.45	.32	.18-.43	.31	.20-.46	.35	.17-.52	.37	.054-.058	.056
Nitrogen, Dissolved TKN (mg N/l)	<.25-.43	<.31	<.25-.45	<.33	<.25-.35	<.29	<.25-.51	<.33	<.25-.40	<.30	-	2.5
Nitrogen, Total Kjeldahl (mg N/l)	.30-.45	.35	<.25-.94	<.58	<.25-.95	<.43	<.25-1.0	<.45	<.25-.72	<.38	-	2.9
Orthophosphate, Dissolved (mg P/l)	.008-.042	.024	.019-.062	.038	.004-.033	.016	.013-.05	.026	.021-.044	.036	.17-.18	.18
Phospate, Ortho (mg P/l)	.004-.049	.023	.018-.042	.032	.004-.049	.020	.010-.052	.021	.020-.040	.031	.18-.19	.19
Phosphate, Total (mg P/l)	.032-.57	.22	.05-.89	.39	.015-.66	.25	.032-.63	.23	.012-.68	.26	.42-.43	.43
DEMAND GROUP												
BOD, 5-day, 20°C (mg/l)	2-6	3.3	2-4	.27	<1-4	<2	<1-5	<2.3	<1-5	<2.7	-	10
COD (mg/l)	5.6-35	17	15-56	31	4-55	22	4.4-41	17	3-33	14	-	54
BIOLOGICAL DATA												
BACTERIOLOGICAL DATA												
Fecal Coliform (#/100 ml)	<1-1,400	<430	120-1,200	600	16-1,600	570	170-2,400	880	120-800	320	400-450	430
Total Coliform (#/100 ml)	14-3,300	1,120	560-7,500	3,490	71-3,700	1,190	320-6,400	2,200	350->18,000	>6,020	-	-
Fecal Streptococci (#/100 ml)	56-35,000	11,600	85-13,000	6,080	47-19,000	6,580	17-21,000	7,030	460-27,000	9,330	860-940	900
BIOMASS MEASUREMENTS												
Chlorophyll-a (mg/l)	3.7-13	10	6-6.1	6.1	.87-1.1	.97	1.5-3.8	2.7	1.1-2.3	1.7	3.9-4.1	4.0

Table 7. Richard B. Russell Preimpoundment Study—Summary of Water Quality and Bacteriology Data For Savannah River and Tributary Stations Collected February 9, 11, and 13 and July 13, 16, and 17, 1981 (Continued, Page 3 of 4)

	Savannah River Stations									
	Station 1		Station 2		Station 6		Station 8		Station 10	
July Parameters (Units)	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
PHYSICAL DATA										
Color (Pt-Co units)	16–100	36	21–90	40	3-11	7.2	10–30	20	3-10	5.3
Turbidity, Hach Turbidimeter (FTU)	5.4–55	23	4.6–19	10	.5–2.3	1.4	1.5–4.4	3.4	.5–1.3	.91
Total Nonfilterable Residue (mg/1)	6–29	14	<5–11	<8.2	-	<5	-	<5	-	<5
CHEMICAL DATA										
MINERALS AND METALS										
Alkalinity, Total (mg $CaCO_3$/1)	18–60	32	25–32	28	15–20	18	19–29	23	18–22	20
Chloride (mg Cl/1)	1.9–2.8	2.2	2.8–3.4	3.1	1.5–2.3	2.0	2.5–5.3	5.4	1.6–10	3.6
Calcium, Total (mg Ca/1)	1.0–6.1	3.0	1.2–2.5	1.9	1.3–1.8	1.5	1.5–2.5	1.9	1.0–1.8	1.4
Hardness, Total (mg $CaCO_3$/1)	9–25	14	11–15	13	7–17	9.2	9–12	11	8–9	9
Iron, Dissolved (mg Fe/1)	-	<.2	-	<.2	-	<.2	-	<.2	-	<.2
Iron, Total (mg Fe/1)	.36–2.7	1.2	.43–1.3	.72	-	<.2	<.2–.45	<.25	-	<.2
Manganese, Dissolved (mg Mn/1)	<.05–.28	<.12	-	<.05	-	<.05	-	<.05	-	<.05
Manganese, Total (mg Mn/1)	<.05–.38	<.17	<.05–.07	<.06	-	<.05	-	<.05	-	<.05
Potassium, Total (mg K/1)	.94–2.1	1.5	1.2–1.8	1.4	.94–1.3	1.1	1.1–1.6	1.4	.90–1.2	1.1
Sodium, Total (mg Na/1)	2.2–3.5	2.7	3.1–4.2	3.5	1.7–2.7	2.4	2.9–5.4	4.4	2.0–2.8	2.4
NUTRIENTS										
Carbon, Total Organic (mg C/1)	2.5–9.0	4.9	3.5–8.5	5.2	2.5–6.5	4.0	3–8	4.8	2.5–14	4.9
Free Carbon Dioxide (mg CO_2/1)	4–25	14	5–18	13	5–27	14	7–18	12	14–35	25
Nitrogen, Total Ammonia (mg N/1)	.02–.12	.081	.029–.17	.066	.018–.078	.040	.020–.074	.050	.011–.074	.035
Nitrogen, Nitrate + Nitrite (mg N/1)	.18–.24	.20	.16–.20	.18	.12–.20	.17	.27–.56	.38	.17–.18	.18
Nitrogen, Dissolved TKN (mg N/1)	<.25–.44	<.28	-	<.25	-	<.25	-	<.25	-	<.25
Nitrogen, Total Kjeldahl (mg N/1)	<.25–.41	<.29	<.25–.28	<.26	-	<.25	<.25–.26	<.25	-	<.25
Orthophospate, Dissolved (mg P/1)	.008–.094	.042	<.005–.13	<.045	<.002–.085	<.044	.029–.12	.074	<.005–.12	<.041
Phospate, Ortho (mg P/1)	<.002–.090	<.033	<.002–.13	<.044	<.002–.071	<.039	.017–.12	.070	<.002–.11	<.037
Phosphate, Total (mg P/1)	.010–.090	.042	.017–.13	.049	<.005–.069	<.026	.018–.16	.074	.004–.014	<.008
DEMAND GROUP										
BOD, 5-day, 20°C (mg/1)	<1–1	<1	<1–4	<2	-	<1	<1–2	<1.3	<1–2	<1.3
COD (mg/1)	1.4–7.6	4.4	4.2–11	6.9	6.5–8.1	7.2	2.3–9.1	5.8	3.6–11	7.6
BIOLOGICAL DATA										
BACTERIOLOGICAL DATA										
Fecal Coliform (#/100 ml)	10–60	36	14–40	25	-	15	7–23	11	2–11	6.5
Total Coliform (#/100 ml)	80–360	188	60–500	218	<1–27	<16	100–400	253	7–180	73
Fecal Streptococci (#/100 ml)	150–390	235	68–720	363	11–230	83	63–890	356	36–900	259
BIOMASS MEASUREMENTS										
Chlorophyll-a (mg/1)	.91–2.9	1.7	.87–2.2	1.5	.18–.25	.22	<.1–.87	<.45	<.1–.58	<.26

Table 7. Richard B. Russell Preimpoundment Study—Summary of Water Quality and Bacteriology Data For Savannah River and Tributary Stations Collected February 9, 11, and 13 and July 13, 16, and 17, 1981 (Continued, Page 4 of 4)

	Tributary Stations													
	Station 3		Station 4		Station 5		Station 7		Station 9		Station 11		Station 12*	
July Parameters (Units)	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
PHYSICAL DATA														
Color (Pt-Co units)	30-47	36	80-180	117	60-75	65	85-100	94	85-110	103	-	300	100-110	105
Turbidity, Hach Turbidimeter (FTU)	4.6-6.3	5.6	22-50	32	7.7-12	9.9	11-13	12	14-16	16	23-24	24	-	45
Total Nonfilterable Residue (mg/l)	-	<5	31-50	39	-	<5	<5-7	<5.8	<5-8	<6.2	40-42	41	-	36
CHEMICAL DATA														
MINERALS AND METALS														
Alkalinity, Total (mg $CaCO_3$/l)	42-47	45	32-50	44	26-30	29	36-40	38	30-34	32	-	63	70-72	71
Chloride (mg Cl/l)	4.1-4.7	4.3	7.2-11	9.1	2.3-13	4.2	2.7-3.7	3.1	4.6-7.1	5.4	-	13	4.2-4.3	4.3
Calcium, Total (mg Ca/l)	2.7-4.0	3.4	3.8-4.4	4.2	1.6-2.5	2.0	2.3-3.7	3.0	4.1-3.8	2.2	8.7-9.2	9.0	-	12
Hardness, Total (mg $CaCO_3$/l)	16-17	17	20-23	22	11-14	12	14-15	15	11-18	13	40-41	41	-	57
Iron, Dissolved (mg Fe/l)	<.2-.24	<.21	<.2-.27	<.22	-	<.2	.21-.35	.28	<.2-.44	<.28	-	<.2	-	<.2
Iron, Total (mg Fe/l)	.48-.66	.58	1.9-4.6	3.1	.59-1.0	.80	1.0-1.5	1.2	1.6-2.3	1.9	1.6-1.8	1.7	3.9-4.5	4.2
Manganese, Dissolved (mg Mn/l)	<.05-.12	<.08	.08-.15	.11	<.05-.06	<.05	.09-.14	.12	.06-.12	.09	.06-.07	.07	-	<.05
Manganese, Total (mg Mn/l)	.09-.17	.11	.21-.25	.23	<.05-.07	<.06	.13-.16	.14	.07-.11	.09	.08-.10	.09	<.05-.06	<.06
Potassium, Total (mg K/l)	1.9-2.2	2.1	2.4-3.3	2.8	1.7-7.6	.67	2.2-2.6	2.4	2.1-2.7	2.4	-	4.3	1.5-1.6	1.6
Sodium, Total (mg Na/l)	4.6-5.6	5.1	6.2-10	7.9	.98-2.7	2.2	3.4-4.2	3.9	6.2-11	7.7	-	37	7.9-8.2	8.1
NUTRIENTS														
Carbon, Total Organic (mg C/l)	3.5-7.0	5.4	4-11	7.4	3-9	4.3	3-8.5	5.4	4-9.5	5.8	30-34	32	3-3.5	3.3
Free Carbon Dioxide (mg CO_2/l)	5-29	14	6-56	17	5-20	11	5-17	11	9-19	14	-	2	1-2	1.5
Nitrogen, Total Ammonia (mg N/l)	.045-.11	.065	.054-.19	.092	.013-.083	.039	.013-.074	.046	.045-.22	.10	-	.061	.012-.015	.014
Nitrogen, Nitrate + Nitrite (mg N/l)	.11-.18	.14	.37-.49	.43	.28-.35	.32	.31-.34	.32	.44-.62	.51	.48-.49	.49	.12-.13	.13
Nitrogen, Dissolved TKN (mg N/l)	-	<.25	<.25-.33	<.30	-	<.25	<.25-.81	<.36	<.25-.31	<.28	-	1.2	-	<.25
Nitrogen, Total Kjeldahl (mg N/l)	<.25-.26	<.25	.36-.50	.42	<.25-.25	<.25	<.25-2.0	<.55	.26-.50	.39	3.3-3.4	3.4	-	<.25
Orthophospate, Dissolved (mg P/l)	<.005-.35	<.062	.026-.11	.056	.006-.12	.044	.024-.10	.057	.15-.19	.17	.56-.57	.57	-	.22
Phospate, Ortho (mg P/l)	<.002-.10	<.036	.018-.12	.058	<.002-.13	<.046	.016-.10	.054	.16-.17	.17	.57-.61	.59	-	.24
Phosphate, Total (mg P/l)	.018-.039	.025	.14-.17	.15	.010-.047	.025	.041-.81	.30	.25-.37	.33	.92-.94	.93	.086-.095	.091
DEMAND GROUP														
BOD, 5-day, 20°C (mg/l)	<1-3	<1.7	1-5	2.3	<1-1	<1	<1-1	<1	-	<1	-	16	-	<1
COD (mg/l)	5.8-7.6	6.8	11-13	12	1.8-13	5.8	2.3-6.3	4.4	1.4-10	6.1	-	>9	-	2.7
BIOLOGICAL DATA														
BACTERIOLOGICAL DATA														
Fecal Coliform (#/100 ml)	22-37	29	21-590	233	51-170	91	110-790	273	72-590	380	73-83	78	59-76	68
Total Coliform (#/100 ml)	140-300	198	400-1,300	>817	40-700	270	400-1,600	850	1,000-9,900	4,820	1,000-1,200	1,100	1,600-2,600	2,100
Fecal Streptococci (#/100 ml)	200-1,700	600	1,200-3,100	1,920	720-8,400	2,880	2,300-8,200	4,650	1,500-6,100	3,950	8,100-9,700	8,900	4,200-5,800	5,000
BIOMASS MEASUREMENTS														
Chlorophyll-a (mg/l)	3.1-5.8	4.3	3.8-9.2	7.1	.38-.99	.73	1.0-2.5	1.6	1.2-3.4	2.1	400-420	410	1.3-13	7.2

Source: WAR, 1981.

3. Normal daily changes in temperature and illumination during the diel sampling in July, and
4. Flow fluctuations in the Savannah and Rocky Rivers due to periodic water releases from Hartwell and Secession Lake Dams during power generation periods.

At all stations in February, water temperatures were 8°C or less (Appendix B). On February 9 and 11, the water temperatures were fairly uniform between all stations, but were slightly lower on February 11 following the passage of the cold front and associated rain. On February 13, the water temperature at all stations had dropped several more degrees, with the coldest temperatures found in the smaller tributaries (overall mean of 3.2°C).

By July, the water temperatures in the tributaries had warmed-up to between 23 and 25°C, and were fairly uniform between stations. The exception to this was Station 3 on Rocky River, which is downstream of Secession Lake and under the influence of the power plant discharges at the Secession Lake Dam. The water at this station was slightly cooler (but <5°C difference) than in the other tributaries (Table 6). Since no power had been generated at Hartwell Dam during the weekend with correspondingly large releases of water, water temperatures in the Savannah River were comparable to those in the tributaries on July 13 (Monday). Following periods of power generation, the water temperature in the Savannah River was approximately 10°C lower during the remainder of the week.

Specific conductance data (see Appendix B) was converted to umhos/cm at 25°C to make the values comparable, since conductance increases approximately 2 percent for each 1°C increase in temperature (Hem, 1959). Specific conductance values in February at Stations 1 through 10 were fairly uniform with all values between 28 and 58 umhos/cm (Table 6). No areal trends were apparent. Values were slightly higher in July

(particularly in the tributaries) with all values ranging between 32 and 109 umhos/cm. The conductivity at Station 11 (see Figure 1 and Table 1) in February and July was 148 and 265 umhos/cm, respectively. Since these values were considerably higher than at other stations, additional sampling in this stream was performed in July at Station 12, which was located above the influence of the Bigelow-Sanford Carpet Factory discharge. Conductivity at this location was 151 umhos/cm, approximately 100 umhos/cm lower than at Station 11 in July.

No areal trends were observed in dissolved oxygen levels in February since all stations were near (>90 percent) or above the saturation level (Appendix B). In July, dissolved oxygen levels and percent saturation values were lower, but were still >5.0 mg/l (55-percent saturation). Anaerobic conditions were not encountered at any of the sampling sites during the study.

In February, pH values for all stations ranged between 3.5 and 6.7, and in July pH values ranged between 5.5 to 7.6. The lowest value (3.5) was found just downstream of Hartwell Dam (Station 10) on February 13 (Appendix B). The reason for this low value is unknown and may be due to meter malfunction since the alkalinity value at this station does not indicate that the pH would be this low. All oxidation-reduction potentials (ORP) in this report have been referenced to the Pt/H_2,H system. In general, ORPs ranged from +407 mv (Station 5, February 11) to +669 mv (Station 10, February 13) during both February and July. ORPs at Stations 11 and 12 were not significantly lower than at the other stations. These ORP levels are characteristic of highly oxygenated waters throughout the southeastern United States. In deepwater lakes and reservoirs, which in the summer become anaerobic near the bottoms, the ORP values can drop below zero. Neither ORP nor dissolved oxygen levels, just downstream of Hartwell Dam, indicate any anaerobic or anoxic water being released.

Several areal and chronological trends in color, turbidity, and total nonfilterable residue levels were detected during the February and July

sampling periods. Color in water principally results from degradation processes in the natural environment. Although colloidal forms of iron and manganese occasionally are the cause of color in water, the most common causes are complex organic compounds originating from the decomposition of naturally occurring organic matter. Surface waters may appear colored due to suspended matter which comprises turbidity, but such color is referred to as apparent color and is differentiated from true color. Turbidity and total nonfilterable residues consist primarily of organic and inorganic particulate matter or solids in the water. Color and turbidity increases have both aesthetic and functional effects. Colored or turbid water interferes with recreational uses of water due to the decrease in both the aesthetic enjoyment of the water and the functional use for swimming and other water contact sports. Highly turbid waters can be dangerous for swimming due to the possibility of unseen submerged hazards and the difficulty in locating swimmers in danger of drowning (EPA, 1976). Principally, the effects of color and turbidity on aquatic life:

1. Reduce light penetration and thereby photosynthesis by phytoplankton and plants,
2. Restrict the zone for aquatic plant growth,
3. Reduce primary productivity and subsequently fish populations,
4. Increase fish egg hatching mortality, and
5. Reduce or cause changes in diversity of macroinvertebrates when streambeds become covered with settleable solids.

In February, color, turbidity, and total nonfilterable residue levels at Stations 1 through 10 were generally low on the first day of sampling, with overall means of 32 Pt-Co units, 5.9 FTU, and <6 mg/l, respectively (Appendix C). Following the 7.1-cm rainfall (Table A-4), watershed runoff increased the levels of these parameters by one to two orders of magnitude on February 11 at all stations, except just downstream of Hartwell Dam at Stations 8 and 10. Flow at these two stations is primarily from discharges from the hypolimnion of Hartwell Lake during power generating periods. By February 13, levels at all stations were

beginning to return to normal. In July, color, turbidity, and total nonfilterable residue levels remained relatively uniform in the tributaries (Stations 3, 4, 5, 7, and 9) during all 3 sampling days (July 13, 15, and 17). Levels in the Savannah River were slightly higher at Stations 1 and 2 on the first sampling day (means of 69 Pt-Co units, 37 FTU, and 26 mg/l for color, turbidity, and total nonfilterable residue, respectively) compared to the other river stations. Since power was not generated over the weekend on July 11 and 12, flow in the river was reduced primarily to that of tributary waters which had higher color and turbidity levels. Following power generation at Hartwell Dam on Monday and Tuesday (July 13 and 14), color, turbidity, and total nonfilterable residue levels decreased at Stations 1 and 2 to means of 27 Pt-Co units, 6.4 FTU, and 9 mg/l, respectively, due to dilution of the tributary water by hypolimnetic water from Hartwell Lake.

Station 11 (located downstream of the Bigelow-Sanford Carpet Factory discharge) had very high color levels (300 to 400 Pt-Co units) in both February and July. In February, the water was a definite purple color; in July, it was green due to the presence of dye in the water. The dye concentrations were high enough to dye the ropes used to attach the periphytometers and Hester-Dendy samplers. Additional sampling was performed in July at Station 12 upstream of the carpet factory discharge. Turbidity and nonfilterable residue levels at Station 12 were still slightly elevated due to the presence of red clay suspended in the water, but the color concentration was considerably lower (Appendix C).

Generally, the water of the Savannah River and its tributaries within the study area can be classified as soft [<75 milligrams (mg) of calcium carbonate ($CaCO_3$) per liter (l) (mg $CaCO_3$/l)] (Durfor and Becker, 1964; EPA, 1976) based on the measured hardness values (Appendix C). Alkalinity and hardness are both expressed in mg $CaCO_3$/l. Alkalinity is the sum total of components in the water that tend to elevate the pH of the water above a value of approximately 4.5. These components are primarily carbonates and bicarbonates in neutral to slightly acidic

freshwater. Therefore, alkalinity is a measure of the waters buffering capacity, and since pH has a direct effect on organisms (as well as an indirect effect on the toxicity of some pollutants in the water), the buffering capacity is important to water quality. Water hardness is caused by the polyvalent metallic ions dissolved in the water. In fresh water, these ions are principally calcium and magnesium. Values for alkalinity and hardness at Stations 1 through 10 were generally <50 and 25 mg $CaCO_3$/l, respectively. Large areal or chronological variations in alkalinity and hardness were not found; however, slightly higher alkalinity values were found at most sampling locations on February 9, prior to the heavy (7.1-cm) rainfall. At Stations 11 and 12, alkalinity and hardness values were also slightly higher with a corresponding increase in calcium levels (means of 58 mg $CaCO_3$/l, 44 mg $CaCo_3$/l, and 9.3 mg Ca/l for alkalinity, hardness, and calcium, respectively) (Appendix C).

Chloride (Cl) levels varied (generally between 1 and 8 mg Cl/l) with the highest levels found at Station 11 (mean of 10.5 mg Cl/l) and the lowest levels found just downstream of Hartwell Dam at Stations 8 and 10 (overall mean for February and July water quality data of 2.9 mg Cl/l). Station 4 on Beaverdam Creek also had slightly higher chloride levels (mean of 7.0 mg Cl/l) compared to the other tributaries (Appendix C and Table 7).

Dissolved and total iron (Fe) concentrations in February were less than 1.0 mg Fe/l at Stations 1 through 10 on February 9. Following the heavy (7.1-cm) rainfall on February 10 and 11, iron concentrations increased greatly in the lower portion of the Savannah River and its tributaries, with mean total iron concentrations >15 mg/l at Station 2 in the Savannah River and in Rocky River, Beaverdam Creek, Coldwater Creek, and Little Generostee Creek (Appendix C). As noted previously, turbidity also increased greatly at these stations due to watershed runoff following the February heavy rainfall. Since iron is a major constituent of clay soils which predominate in this area, the increase in suspended clay and associated iron would account for the increased total iron concentrations.

Total or dissolved? [illegible]

Along with turbidity, iron concentrations had practically returned to normal by February 13. During July, total and dissolved iron concentrations followed the same trend as turbidity at Stations 1 through 10. Levels were slightly elevated in the lower portion of the Savannah River on July 13 (mean total iron concentration of 1.93 mg Fe/l for Stations 1 and 2). This was due to the absence of power generation the previous weekend, decreased river flow, and increased influence of tributary waters with associated higher turbidity, suspended clay, and iron levels. Dissolved and total iron concentrations found downstream of the Bigelow-Sanford Carpet Factory discharge outlet were comparable to levels in the other tributaries. The iron concentrations upstream of the discharge were higher (total iron concentration of 4.19 mg Fe/l) than at Station 11 (1.66 mg Fe/l) in July, but again, this was probably due to the higher turbidity and associated suspended clay at that location. In general, iron concentrations were within the range expected in slightly acidic surface waters where clay is the predominant soil type (Hem, 1959).

Mean dissolved and total manganese (Mn) concentrations were always <1 mg Mn/l at all stations during both February and July sampling periods, with most concentrations near or below the detection limit (0.05 mg Mn/l). Concentrations in the tributaries were only slightly higher than in the Savannah River, with the levels found comparable to levels in flowing freshwater streams and rivers throughout the southeastern United States (Hem, 1959; EPA, 1976). In waters low in dissolved solids, the proportion of potassium to sodium may be nearly 1 to 1. This condition is probably most common in waters associated with sialic igneous rocks such as those dominant in the study area. Sodium concentrations over 5 mg Na/l, however, are usually accompanied by smaller relative amounts of potassium. The concentration of potassium seldom rises over 15 mg K/l in ordinary surface waters and is usually 10 mg K/l or less (Hem, 1959). These levels agree with concentrations found in this study. In general, there was a slight increase in total potassium concentrations (to a mean of 3.5 mg K/l for Stations 1 through 10) and a slight decrease in total sodium concentrations (to a mean of 2.6 mg Na/l)

on February 11 following a heavy (7.1-cm) rainfall compared to mean concentrations of 1.5 mg K/l and 3.8 mg Na/l for Stations 1 through 10 on February 9. No detectable trends were found at Stations 1 through 10 in July and the mean potassium and sodium concentrations were 1.80 and 4.20 mg/l, respectively. In both February and July, potassium concentrations were only slightly greater below the Bigelow-Sanford Carpet Factory discharge (mean 5.84 mg K/l), but levels of sodium were significantly higher (mean 27.68 mg Na/l) than in the other tributaries. These increased levels apparently are related to the carpet factory discharges since the July potassium and sodium concentrations found upstream of the discharge (replicate means of 1.56 and 8.02 mg/l, respectively) were comparable to those found at the other stations.

Total organic carbon (TOC) values were again higher in the lower portion of the Savannah River (mean of 5.8 mg C/l at Stations 1 and 2) and its tributaries (mean of 5.6 mg C/l) on February 11, following the 7.1-cm rainfall, than on February 9 or 13 (mean of 2.2 mg C/l on both days for the same stations). Although no areal or chronological trends are apparent in July, the values at each station generally were higher (overall mean of 5.3 mg C/l) than in February (mean of 2.9 mg C/l). These elevated TOC levels are probably due to increased phytoplankton populations present in the water during July. TOC levels at Station 11 were 4 to 6 times greater than at any other sampling location in February or July. Mean daily concentrations for Station 11 were 16.0 and 32.3 mg C/l in February and July, respectively. Again, these elevated TOC levels appear to be related to the Bigelow-Sanford Carpet Factory discharge since TOC levels in the stream upstream of the discharge (Station 12) were lower (mean of 3.3 mg C/l in July) and comparable to those found at the other stations (Table 7).

Free CO_2 concentrations (as determined by alkalinity titrations) showed no significant areal concentration trends during either February or July at Stations 1 through 10. Values for these stations were generally lower in July (overall mean of 15 mg CO_2/l) than in February (overall mean of

39 mg CO_2/l) at all stations. Free CO_2 levels at Station 11 were significantly lower (11 and 2 mg CO_2/l in February and July, respectively) than at the other stations during both sampling periods. However, these depressed levels were just as low above the Bigelow-Sanford Carpet Factory discharge (2 mg CO_2/l at Station 12) in July as were Station 11 levels.

Nitrogen (N) can occur in several forms in freshwater rivers and streams. These forms include nitrate, nitrite, and ammonium ions. Nitrate is formed by the complete oxidation of ammonium ions by soil or water microorganisms. Nitrite is an intermediate product of this nitrification process and is formed by partial oxidation of ammonium ions or reduction of nitrate. In oxygenated natural water systems, nitrite is rapidly oxidized to nitrate. Growing plants can assimilate either nitrate or ammonium ions and convert them to protein. The toxicity of aqueous solutions of ammonia is due to the dissolved un-ionized form of ammonia (NH_3), and is very dependent upon both temperature and pH as well as the concentration of total ammonia. As temperature and pH increase, the concentration or percentage of NH_3 increases. This is due to the shift in the equilibrium relationship among NH_3, NH_4^+, and OH^- ions. Among the major point sources of nitrogen entry into water bodies are industrial and municipal wastewaters, septic tanks, and feedlot runoff. Diffuse sources of nitrogen include farm-site fertilizer and animal wastes, lawn fertilizer, leachate from waste disposal in dumps or sanitary landfills, atmospheric fallout, nitric oxide and nitrite discharges from automobiles and other combustion processes, and losses from natural sources such as mineralization of soil organic matter (EPA, 1976).

Total ammonia, nitrate plus nitrite, total Kjeldahl nitrogen (TKN), and dissolved TKN levels generally were slightly higher in the tributaries than in the Savannah River, and only increased slightly following the heavy (7.1-cm) rainfall in February (Appendix C). No substantial increases or decreases were found when comparing the February levels at

each station to those in July. In the Savannah River, TKN and dissolved TKN concentrations were near or below the detection level (0.25 mg N/l) at all sampling locations. Levels of nitrate plus nitrite nitrogen at Station 11 (mean 0.27 mg N/l) were comparable to those found at the other stations. However, total ammonia in February (mean 1.8 mg N/l), and TKN and dissolved TKN levels in both February (mean of 2.92 and 2.49 mg N/l, respectively) and July (means of 3.35 and 1.17 mg N/l, respectively) at Station 11 were approximately one order of magnitude higher than in the other tributaries. These elevated levels appear to be related to the Bigelow-Sanford Carpet Factory discharge, since concentrations of these parameters were again lower upstream of the discharge at Station 12 with replicate means of 0.014, <0.25, and <0.25 mg N/l, respectively, for total ammonia, TKN, and dissolved TKN.

On February 9, mean concentrations at Station 1 through 10 for total phosphate, orthophosphate, and dissolved orthophosphate were 0.033, <0.009, and 0.012 mg P/l, respectively. Total phosphate, orthophosphate, and dissolved orthophosphate increased on February 11 by approximately one order of magnitude in the lower portion of the Savannah River and in its tributaries following the 7.1-cm rainfall on February 10 and 11. By February 13, these levels had again almost returned to the prerainfall levels. Since the sources of phosphate include organic wastes, soil leaching, and phosphate fertilizers, increases in phosphate levels would not be unusual following a heavy rainfall and associated watershed runoff.

Values for orthophosphate and dissolved orthophosphate on July 15 are believed to be inaccurate based on replicate sample variation. However, total phosphate concentrations on July 15 seem to be consistent with levels found on other days and the rest of the data. A comparison of orthophosphate and dissolved orthophosphate values for July 13 versus July 17, and a comparison of total phosphate values for all 3 sampling days (July 13, 15, and 17), indicate higher phosphate levels in the tributaries than in the Savannah River. Similar comparisons also indicate

slightly elevated levels in the lower portion of the Savannah River on July 13 prior to passage of the water surge following power generation that day. During July, mean total phosphate (P) levels in the tributaries and in the Savannah River were 0.165 and 0.036 mg P/l, respectively.

Due to the inaccurate orthophosphate and dissolved orthophosphate values in July, it is not clear if the elevated orthophosphate levels found at Station 11 in February (replicate means of 0.184 and 0.178 mg P/l, respectively, for orthophosphate and dissolved orthophosphate) are related to the Bigelow-Sanford Carpet Factory discharge, or are characteristic of the water upstream of the discharge. However, total phosphate levels were higher at Station 11 during both February (replicate mean of 0.423 mg P/l) and July (replicate mean of 0.928 mg P/l), and appear to be related to the discharge since the total phosphate concentration was one order of magnitude lower upstream of the discharge in July (replicate mean of 0.091 mg P/l).

BOD and chemical oxygen demand (COD), together with TOC, provide an index to the degree of organic pollution present in the water. BOD is a measure of the equivalent amount of oxygen required to remove organic matter from the water in the process of decomposition by aerobic bacteria. COD is a measure of the equivalent amount of oxygen required to remove all organic matter from the water. Therefore, COD values will usually be higher than BOD values. Following the 7.1-cm rainfall in February, BOD levels slightly increased at all stations from a mean of 1.5 mg/l to 3.8 mg/l, but COD levels substantially increased in the lower portion of the Savannah River and its tributaries from a mean of 7.2 mg/l to 37 mg/l. These elevated BOD and COD levels would be expected with the excessive watershed runoff following the February heavy (7.1-cm) rainfall. No apparent trends were found in July in BOD (most values were below the detection level of 1 mg/l) and COD (range 1.4 to 13.0 mg/l, mean 6.9 mg/l) levels with values comparable to the prerainfall values found in February. BOD and COD levels downstream of the Bigelow-Sanford

Carpet Factory outlet were 10 mg/l and 54 mg/l, respectively, in February and 16 mg/l and 79 mg/l, respectively, in July. Upstream of the discharge at Station 12, BOD and COD levels were more than 10 times lower than at Station 11 in July, with BOD <1 mg/l and COD 2.7 mg/l.

Chlorophyll-a levels were relatively uniform at all stations in February, including Station 11. However, in the lower portion of the Savannah River and in Beaverdam, Coldwater, and Cedar Creeks, no chlorophyll determinations could be made following the February heavy (7.1-cm) rainfall due to the excessive amount of clay and suspended material in the water. In July, just downstream of Hartwell Dam, the chlorophyll levels were near or below the detection level (mean 0.26 ug/l). This could be expected since water is withdrawn from the hypolimnion of Hartwell Lake during power generation. Release of this water also reduced chlorophyll levels in the remainder of the Savannah River within the study area (mean <1.0 ug/l) compared to its tributaries (mean 3.15 ug/l) in July. The highest chlorophyll levels were found in July in Beaverdam Creek (mean 7.08 ug/l), which has an extensive drainage area that would permit phytoplankton populations to develop. In Appendix C it appears that at Station 11 the chlorophyll-a level was exceedingly high (approximately 410 ug/l) in July. As noted previously, however, there was a substantial concentration (color level of 300 Pt-Co units) of green dye present in the water downstream of the Bigelow-Sanford Carpet Factory discharge. This green dye would react at the same wavelengths as chlorophyll during the chlorophyll analysis, and accounts for the apparently high value found at Station 11.

Bacteriology

One of the most frequently applied indicators of water quality is coliform bacteria which are considered primary indicators of fecal contamination. The coliform group is made up of a number of bacteria including the genera *Klebsiella*, *Escherichia*, *Serratia*, *Erwinia*, and *Enterobacteria*. Total coliform (TC) bacteria are all gram-negative asporogenous rods and have been associated with feces of warmblooded

animals and with soil. The fecal coliform (FC) bacteria, which comprise a portion of the TC group, are able to grow at 44.5°C. They have proven to be of more sanitary significance than the use of TC bacteria because they are restricted to the intestinal tract of warmblooded animals (EPA, 1976). Fecal streptococci (FS) also are found in the feces of warm-blooded animals and the ratio of FC to FS is useful in determining the type of pollution present. FC to FS (FC:FS) ratios >4.1 are indicative of human sources and ratios of <0.7 are indicative of farm animal (nonhuman) sources of contamination (American Public Health Association, et al., 1980).

Bacteriological results for February and July are included in Appendix C with data summarized in Table 7. Sample analyses were completed for all collections in February except for TC at Stations 11 on February 13 when the colonies were too numerous to count even on the lowest-concentration (1-ml) plates (counts would have been >20,000/100 ml). July bacteriological results are complete except for a replicate at Stations 6 and 3 (on July 13) for FC; this lost replicate was due to water leaking into the plates. Coliform results are also missing or partial on July 15 at Station 6 and on July 17 at Stations 6 and 9, due to the presence of noncoliform colonies masking coliform colonies on the plates or the coliform colonies on the plates were too numerous to count even at the lowest concentrations. In July, many of the TC plates had many noncoliform colonies present which masked the results at the 10- and 100-ml sample sizes. Several controls were run to check for contamination of the sample bottles, dilution water bottles, and the air. All control results were negative and indicate that the noncoliforms were actually in the water samples and were simply not being selected against on the plates.

Although the set of data obtained was not complete, enough data was obtained to establish several trends. Prior to the 7.1-cm rainfall in February, concentrations of both coliforms and FS were generally low at

all stations with FC generally <20/100 ml in the Savannah River and <150/100 ml in the tributaries, except at Station 7 where FC levels were <300/100 ml. Following the February heavy (7.1-cm) rainfall, FC levels rose substantially to 500 to over 2,000/100 ml, except just below Hartwell Dam where concentrations remained <10/100 ml. TC and FS concentrations also increased with TC levels >16,000/100 ml at Station 9 and FS levels >34,000/100 ml at Station 3. By February 13, coliform and streptococcus concentrations had again partially returned to the prerainfall level (particularly in the Savannah River) due to the flushing action of the discharged water during periods of power generation.

Coliform and streptococcus concentrations were generally uniform in the Savannah River during the July sampling period. Concentrations just below the dam were slightly elevated, compared to the prerainfall levels found in February, presumably due to increased use of Hartwell Lake during the summer. Coliform and streptococcus concentrations were higher in the tributaries in July. The highest coliform levels were found in Cedar Creek (Station 9) (geometric means of 280/100 ml and 2,606/100 ml for FC and TC concentrations, respectively) and the highest FS concentrations were found below the Bigelow-Sanford Carpet Factory discharge (geometric mean of 8,864/100 ml), although collections were made on 1 day only at this station (Station 11) in July.

FC:FS ratios indicate nonhuman bacterial sources for all samples collected during both February and July, except at Station 7 (Little Generostee Creek) on February 9, when the FC:FS ratio was approximately 14. The reason for this high ratio at Station 7 and on February 9 is unknown.

Diel Water Quality

Complete in situ and laboratory water quality results for the July 16 and 17 diel sampling conducted at Stations 2, 3, 4, and 10 are presented in Appendices B and C. Sampling began at Hour 1000 and continued at 3-hour intervals for a period of 24 hours. During the last cycle (starting at

Hour 0700), a complete set of water quality samples was collected at each station to complete the normal alternate day water quality sampling, which was performed at the remainder of the stations upon completion of the diel sampling. In order to facilitate discussion, the diel results will be presented on a "per station" basis.

Station 10, Savannah River, Downstream of Hartwell Dam--Due to the periodic releases of large volumes of water for short periods of time during power generation at Hartwell Dam, one would not expect a normal series of diurnal/nocturnal trends to be found at this station. during the diel sampling, water was released from Hartwell Dam for power generation from Hours 1410 to 1813. Therefore, as shown in Appendix B (Table B-10), there was a sharp drop in water temperature, dissolved oxygen, and corresponding percent saturation of dissolved oxygen in the third cycle at Hour 1630 to levels of 12.0°C, 6.0 mg/l, and 55-percent saturation, respectively. Since water is withdrawn from the hypolimnion of Hartwell Lake during power generation (see Introduction), a decrease in these parameters would be expected. Following completion of power generation and water discharge at Hartwell Dam, the dissolved oxygen level rapidly returned to "normal" and only a small increase in temperature was measured during the remainder of diel sampling. The other parameters (specific conductance and pH) did not significantly vary during diel sampling at this station with mean values of 40 umhos/cm at 25°C and 5.9 standard units, respectively.

At Station 10, no significant amount of variation was found during the diel in total nonfilterable residue (mean <5 mg/l), alkalinity (14 mg $CaCO_3$/l), or TOC (2.6 mg C/l) (Appendix C, Table C-7). The highest concentrations of free CO_2 (89 mg CO_2/l) and total ammonia nitrogen (0.292 mg N/l) were found during the third cycle at Hour 1630, during which time water was being discharged at Hartwell Dam. Nitrate plus nitrite nitrogen levels gradually increased slightly until Hour 0130 (0.292 mg N/l) and then declined. The reason for this is unknown. All TKN and dissolved TKN levels were near or below the detection level

(0.25 mg N/l), with only a slight increase found in mid-afternoon. All phosphate levels (dissolved ortho, ortho, and total) were also near or below the detection level (0.005 mg P/l). During Cycles 5 and 6 (Hours 2230 and 0130), the orthophosphate levels were above the total phosphate levels. Since the levels were near the detection level, the reason for the higher orthophosphate levels may be due to normal analysis variation.

Station 2, Savannah River, Georgia Highway 72 Bridge--Only slight variations were found at Station 2 during diel sampling. Due to the periodic water releases from Hartwell Dam, it is difficult to determine the cause of the variation which was observed. The water temperature increased during the first three cycles, from 17.0°C at Hour 1045 to 21.0°C at Hour 1630, and then decreased again gradually to 19.0°C at Hour 0730 on July 17. Initially, this would appear to be a normal diel sampling cycle. However, the water released from Hartwell Dam between Hours 1410 to 1813 on July 16 had a travel time of approximately 7 to 8 hours for the wave front to reach Station 2. Therefore, part of the cause of the decrease in both the temperature and dissolved oxygen levels (to 8.8 mg/l at Hour 0135), which were found between Hours 2230 and 0415, may be due to the water released from Hartwell Lake during power generation on July 16. Consistent with Station 10, there was no significant variation in specific conductance or pH at this station during the diel sampling with mean levels of 45 umhos/cm at 25°C and 6.1 standard units, respectively.

Chemical parameter results also showed only slight variations at Station 2. Total nonfilterable residue was always below the detection limit (5 mg/l), except at Hour 0135 when the level was 8 mg/l. Water discharged from Hartwell Dam was present at this time at Station 2, but would not account for the increase since total nonfilterable residue levels at Station 10 were always below the detection limit (5 mg/l). However, water was also being released from Secession Lake at this time, and was passing down Rocky River (see following section on Station 3) and

into the Savannah River above Station 2. This water had total nonfilterable residue levels of 12 to 20 mg/l, and following dilution in the Savannah River, would account for the higher level noted at Hour 0135 at Station 2. Alkalinity levels had little variation between cycles but were higher (mean 22 mg $CaCO_3/l$) than just below Hartwell Dam (mean 14 mg $CaCO_3/l$). These elevated levels were probably primarily due to tributary influence, particularly Rocky River and Beaverdam Creek which had alkalinity levels generally between 30 and 50 mg $CaCO_3/l$. No trends were noted for TOC (mean 3.6 mg C/l), free CO_2 (mean 19 mg CO_2/l), total ammonia nitrogen (mean 0.094 mg N/l), or nitrate plus nitrite nitrogen (mean 0.178 mg N/l). TKN and dissolved TKN levels were near or below the detection level (0.25 mg N/l) during all sampling cycles. Phosphate levels also were near or below the detection level (0.005 mg/l) during all cycles, except for the last three when a slight increase was found (total phosphate concentration was 0.025 mg P/l at Hour 0415). Again, this slight increase was probably due to the Rocky River discharges which had total phosphate levels of approximately 20 to 50 mg P/l.

Station 3, Rocky River, County Road 64 Bridge--Only slight variations were found in the *in situ* parameters measured at Station 3 on Rocky River. Determination and interpretation of the causes for these variations was difficult due to the release of water from Secession Lake upstream of Station 3 for power generation. This water release was very apparent due to the rapid rise in water level and increased water flow during Cycles 3 through 7 of the diel sampling. Concurrent with the rise in water level during Cycle 3, there was a slight decrease measured in temperature and dissolved oxygen (to 24.0°C and 6.4 mg/l, respectively). The cause of the very slight variations measured in these and the other parameters during the remainder of the diel sampling (Appendix B, Table B-8) was probably due to a combination of normal diurnal/nocturnal cycles and the effect of the water released from Secession Lake.

Chemical parameter results (Appendix C, Table C-7) also show an increase in total nonfilterable residue, total ammonia nitrogen, TKN, dissolved TKN, and total phosphate levels during the period of water release for power generation with high values of 20 mg/l, 0.212 mg N/l, 0.45 mg N/l, 0.52 mg N/l, and 0.047 mg P/l, respectively. Since no sampling was performed in Secession Lake, it can only be assumed that the elevated chemical parameter levels were due to higher levels found in the lake. No trends were noted in alkalinity (mean 39 mg $CaCO_3$/l), TOC (mean 4.2 mg C/l), free CO_2 (mean 28 mg CO_2/l), nitrate plus nitrite nitrogen (mean 0.105 mg N/l), or orthophosphate levels (generally <0.005 mg P/l), or the levels were below the detection point.

Station 4, Beaverdam Creek, Bridge 4.0 km East of Middleton--Station 4 on Beaverdam Creek is the only one of the four diel stations (Station 2, 3, 4, and 10) where one would expect a typical diel trend in results due to the absence of any dam upstream. During the diel study, temperature, dissolved oxygen, percent saturation of dissolved oxygen, and pH all increased during the first three cycles to values of 30.5°C, 8.6 mg/l, 114-percent saturation, and 7.7 standard units, respectively (Appendix B, Table B-9). These four parameters then decreased slowly through the night until Hour 0415 when levels were 26.0°C, 6.0 mg/l, 73-percent saturation, and 6.6 standard units, respectively. Just after dawn, the dissolved oxygen and percent saturation levels then began to rise again.

No consistent trends were noted for any of the chemical parameters at this station except that free CO_2 was considerably higher in Cycle 1 (41 mg CO_2/l) than during the remainder of the study. During Cycles 2 through 4, daytime free CO_2 levels were <3 mg CO_2/l and at night the levels increased again to 11 to 14 mg CO_2/l. One explanation for this would be that photosynthesis by phytoplankton, periphyton, and aquatic plants would remove CO_2 from the water during the day. This also would account for the slight increase in pH levels found during the day to 7.7 at Hour 1615. As free CO_2 was withdrawn, the water would become more basic and the pH would rise. At night, with no photosynthesis by the

algae and plants taking place, CO_2 levels would increase due to plant and algal respiration. This would increase the free CO_2 levels, increase the acidity of the water, and lower the pH.

A comparison of the chemical levels in Beaverdam Creek to levels at the other diel stations shows increased total nonfilterable residue levels (mean 24 mg/l) and increased phosphate levels (mean total phosphate 0.124 mg P/l). These increased levels may be due to the influence of Middleton and Elberton, Georgia, which are upstream of the sampling location in Beaverdam Creek.

Water Quality Criteria

Table 8 presents State of Georgia and State of South Carolina stream classifications for the respective portions of the rivers and creeks in which the 12 water quality sampling stations were located. These classifications are defined and explained in Tables 9 and 10, which also give the water quality criteria (for which sampling was performed) for Georgia and South Carolina, respectively. Table 11 presents the drinking water criteria of South Carolina for allowable concentrations of heavy metals and pesticides. During this study, however, no analyses were performed for heavy metals or pesticides in the water at any of the stations. Table 12 presents EPA's water quality criteria for which sampling was actually performed.

A comparison of the water quality results (Appendices B and C) to the water quality criteria presented in Tables 8 through 12 show that the detected levels generally were within acceptable levels for most of the parameters. Both Georgia and South Carolina have maximum water temperature criteria of 32.2°C for recreational and fishing waters. All temperature determinations were less than this allowable maximum at all times during this study. EPA temperature criteria are dependent on location, time of the year, and sensitivity of the species present in the study area.

Table 8. Richard B. Russell Preimpoundment Study—Stream and Water Classifications for the States of Georgia and South Carolina

Station	Classification* Georgia	South Carolina†
1	Recreation	Class A
2	Recreation	Class A
3		Class B
4	Fishing	
5	Fishing	
6	Recreation and Secondary Trout Waters	Class A
7		Class B
8	Recreation and Secondary Trout Waters	Class A
9	Fishing	
10	Recreation and Secondary Trout Waters	Class A
11		Class B
12		Class B

* Georgia classifications were obtained from:

Environmental Protection Division. 1980. Water-use classifications, trout stream designations, and water quality standards for the surface waters of the State of Georgia. Georgia Department of Natural Resources, Atlanta, Georgia. 29 p.

South Carolina classifications were obtained from:

South Carolina Department of Health and Environmental Control. 1980. Stream classifications for the State of South Carolina Office of Environmental Quality Control, Columbia, South Carolina. 27 p.

† Classes are defined by South Carolina as follows:

Class A—Freshwaters suitable for primary recreation. Also suitable for uses listed in Class B.

Class B—Freshwaters suitable for secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with requirements of the Department. Suitable for fishing, survival and propagation of fish, and other fauna and flora. Also suitable for industrial and agricultural uses.

Table 9. Richard B. Russell Preimpoundment Study—Georgia Water Quality Criteria For Which Sampling Was Performed

Item	Specification
Drinking Water Supplies*	
	Criteria not listed since there are no portions of the Savannah River or its tributaries within the study area which are classified for drinking water supply use.
Recreation Waters†	
Bacteria	Fecal coliform not to exceed a geometric mean of 200/100 ml unless studies show the natural level to exceed 200/100 ml occasionally. In which case the geometric mean fecal coliform level shall not exceed 300/100 ml in lakes and reservoirs and 300/100 ml in free flowing freshwater streams.
Dissolved Oxygen	Daily average of 5.0 ml/1 and no less than 4.0 mg/1 at all times for waters supporting warm water fish species.
pH	Within the range of 6.0 to 8.5
Toxic Wastes, Other Deleterious Materials	None in concentrations that would harm man, fish and game, or other beneficial aquatic life.
Temperature	Not to exceed 32.2°C (90°F). At no time is the temperature of the receiving waters to be increased more than 2.4°C (5°F) above intake temperature.
Fishing and Secondary Trout Waters**	
Dissolved Oxygen	Daily average of 6.0 mg/1 and no less than 5.0 mg/1 at all times for waters designated as trout streams by the State Game and Fish Division. Daily average of 5.0 mg/1 and no less than 4.0 mg/1 at all times for waters supporting warm water species of fish.
pH	Within the range of 6.0 to 8.5.
Bacteria	Fecal coliform not to exceed a geometric mean of 1,000/100 ml based on at least 4 samples taken over a 30-day period and not to exceed a maximum of 4,000/100 ml.

Table 9. Richard B. Russell Preimpoundment Study—Georgia Water Quality Criteria For Which Sampling Was Performed (Continued, Page 2 of 2)

Item	Specification
Fishing and Secondary Trout Waters** (Continued)	
Temperature	Not to exceed 32.2°C (90°F). At no time is the temperature of the receiving waters to be increased more than 2.4°C (5°F) above intake temperature. In streams designated as secondary trout streams, there shall be no temperature elevation greater than 1°C (2°F) above the natural level.
Toxic Wastes, Other Deleterious Material	None in concentrations that would harm man, fish and game, or other beneficial aquatic life.

* Freshwaters suitable for human consumption and food processing following approved treatment of disinfection to meet the Federal Drinking Water Standards. Also suitable for any other use requiring water of a lower quality.

† Freshwaters suitable for general recreational activities such as water skiing, boating, and swimming, or for any other use requiring water of a lower quality.

** Freshwaters suitable for fishing, propagation of fish, shellfish, game, and other aquatic life, or for any other use requiring water of a lower quality.

Source: Environmental Protection Division. 1980. Rules and regulations for water quality control. Chapter 391-3-6. Georgia Department of Natural Resources, Atlanta, Georgia. 65 p.

Table 10. Richard B. Russell Preimpoundment Study—South Carolina Water Quality Criteria For Which Sampling Was Performed

Item	Specification
Class AA*	
Criteria not listed since there are no portions of the Savannah River or its tributaries within the study area which are classified Class AA.	
Class A†	
Garbage, Cinders, Ashes, Sludge, or Other Refuse	None allowed.
Treated Wastes, Toxic Wastes, Deleterious Substances, Colored or Other Wastes	None alone or in combination with other substances or wastes in sufficient amounts to make the waters unsafe or unsuitable for primary contact recreation or to impair the waters for any other best usage as determined for the specific waters which are assigned to these classes.
Dissolved Oxygen	Daily average not less than 5 mg/l, with a low of 4 mg/l, except that specified waters may have an average of 4 mg/l due to natural conditions.
Fecal Coliforms	Not to exceed a geometric mean of 200/100 ml, based on 5 consecutive samples during any 30-day period; nor shall more than 10 percent of the total samples during any 30-day period exceed 400/100 ml.
pH	Range between 6.0 and 8.0, except that specified waters may range from 5.0 to 8.0, due to natural conditions.
Temperature	Maximum temperature in Class A waters shall not exceed 90°F (32.2°C) at any time.
Class B**	
Garbage, Cinders, Ashes Sludge, or Other Refuse	None allowed.
Treated Wastes, Toxic Wastes, Deleterious Substances, Colored or Other Wastes	None alone or in combination with other substances or wastes in sufficient amounts to be harmful to the survival of freshwater fauna and flora or the culture or propagation thereof; to adversely affect the taste, color, odor, or sanitary condition of fish for human consumption; to make the waters unsafe or unsuitable for

Table 10. Richard B. Russell Preimpoundment Study—South Carolina Water Quality Criteria For Which Sampling Was Performed (Continued, Page 2 of 2)

Item	Specification
Class B** (Continued)	
	a source of drir'-'ng water supply after conventional treatment; to make the waters unsafe or unsuitable for secondary contact recreation; or to impair the waters for any other best usage as determined for the specific waters which are assigned to these classes.
Dissolved Oxygen	Same as Class A waters.
Fecal Coliforms	Not to exceed a geometric mean of 1,000/100 ml based on 5 consecutive samples during any 30-day period; not to exceed 2,000/100 ml in more than 20 percent of the samples examined during such period.
pH	Range between 6.0 and 8.5, except that specified waters may range from 5.0 to 8.5, due to natural conditions.
Temperature	Same as Class. A waters.

* Freshwaters which constitute an outstanding recreational or ecological resource and are suitable as a source for drinking water supply purposes following specified treatment. Also suitable for uses listed in Class A and Class B.

† Freshwaters suitable for primary recreation. Also suitable for uses listed in Class B.

** Freshwaters suitable for secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with requirements of the Department. Suitable for fishing, survival and propagation of fish, and other fauna and flora. Also suitable for industrial and agricultural uses.

Source: South Carolina Department of Health and Environmental Control. 1981. Water classification standards system for the state of South Carolina. Office of Environmental Quality Control, Columbia, South Carolina. 16 p.

Table 11. Richard B. Russell Preimpoundment Study—Drinking Water Quality Criteria For South Carolina

Parameter	South Carolina
Metals	
Arsenic	0.005 mg/l
Barium	1.0 mg/l
Cadmium	0.010 mg/l
Chromium	0.05 mg/l
Fluoride	1.6 mg/l
Lead	0.05 mg/l
Mercury	0.002 mg/l
Nitrate (as N)	10.0 mg/l
Selenium	0.01 mg/l
Silver	0.05 mg/l
Pesticides	
Endrin	0.0002 mg/l
Lindane	0.004 mg/l
Methoxychlor	0.1 mg/l
Toxaphene	0.005 mg/l
2,4-D	0.1 mg/l
2,4,5-TP Silvex	0.01 mg/l

Source: South Carolina Department of Health and Environmental Control. 1981. State primary drinking water regulations. Division of Water Supply, Columbia, South Carolina. 135 p.

Table 12. Richard B. Russell Preimpoundment Study—EPA (1976) Water Quality Criteria For Which Sampling Was Performed

Parameter	Freshwater Aquatic Life	Domestic Water Supplies
Alkalinity	20 mg/1 as $CaCO_3$	
Ammonia	0.02 mg/1 as un-ionized ammonia	
Chlorides, Total		250 mg/1
Color	Should not reduce compensation point >10 percent	<75 color units on the platinum-cobalt scale
Dissolved Oxygen	5.0 mg/1	
Fecal Coliform Bacteria	For bathing waters, should not exceed 200/100 ml based on a minimum of 5 samples over a 30-day period; nor should more than 10 percent of the total samples taken during any 30-day period exceed 400/100 ml	
Hardness	0 - 75 mg/1 $CaCO_3$ = soft 75 - 150 mg/1 $CaCO_3$ = moderately hard 150 - 300 mg/1 $CaCO_3$ = hard	
Iron	1.0 mg/1	0.3 mg/1
Manganese		0.05 mg/1
Nitrate + Nitrite		10 mg/1 nitrate nitrogen
pH	6.5-9.0	5-9
Phosphate	None	None
Temperature	Spacially, seasonally, and species dependent	
Turbidity	Should not reduce compensation point >10 percent	

Source: U.S. Environmental Protection Agency. 1976. Quality criteria for water. EPA, Washington, DC. EPA-440/9-76-023. 256 pp.

During this study, all dissolved oxygen levels (Appendix B) were above the minimum allowable levels for Georgia, South Carolina, and EPA (Tables 9, 10, and 12 respectively), since all recorded levels were above 5.0 mg/l in both February and July. Georgia, South Carolina, and EPA all have water quality criteria for pH between 6.0 and 9.0, except when lower due to natural conditions. During this study, all pH values were above pH 5.0, except at Stations 7, 8, and 10 on February 13 when pH values were 4.3, 4.4, and 3.5, respectively. The reason for these low values is unknown, but it is assumed that they are due to natural causes since no highly acidic water discharges are known in the study area. No water quality criteria are specified for specific conductance or oxidation reduction potential by Georgia, South Carolina, or EPA.

Georgia and South Carolina do not have any specific water quality criteria for any of the chemical parameters measured from the water samples during this study. South Carolina does have drinking water quality criteria for heavy metals and pesticides (Table 11). However, analyses for heavy metal and pesticide levels in the water samples were not part of the scope of work for this study.

Table 12 shows EPA-specified water quality criteria for alkalinity, ammonia, and iron for freshwater aquatic life. Alkalinity levels were frequently below the 20 mg $CaCO_3$/l EPA minimum for freshwater aquatic life during July in the Savannah River and at most sampling locations during February (especially following the heavy (7.1-cm) rainfall on February 10 and 11). Based on the other chemical analyses in Appendix C, these low alkalinity concentrations are probably due to natural causes. Ammonia concentrations were always below the EPA criterion of 0.02 mg/l (as un-ionized ammonia) for freshwater aquatic life. The un-ionized ammonia concentrations were determined from the temperature, pH, and total ammonia concentrations in Appendices B and C, and the conversion table for total ammonia to un-ionized ammonia given in the EPA water quality criteria document (EPA, 1976). Total iron concentrations were below the EPA criterion of 1.0 mg/l at all sampling locations on

February 9. However, iron concentrations were above 1.0 mg/l at most stations on February 11 and 13 and in the tributaries during July (Appendix C). As previously noted in the water quality section (Results, Water Quality), these increased iron concentrations are due to natural causes (primarily watershed runoff containing clays which usually have iron as a major constituent).

Due to the wide natural variation in color and turbidity in bodies of water, Georgia and South Carolina do not have exact maximum allowable levels specified for these parameters. However, Georgia and South Carolina do require that color and turbidity levels should be low enough so as not to impair the water uses for which the waters are classified. The 1976 EPA water quality criteria specify that color and turbidity levels should not reduce the compensation point >10 percent. Variation in color and turbidity levels measured during this study were primarily due to natural causes such as increases in sediment load due to watershed runoff. The exception to this was at Station 11 downstream of the Bigelow-Sanford Carpet Factory discharge. As previously noted, color levels were approximately 300 to 400 Pt-Co units due to the presence of dye in the discharged water from the factory. Due to the small size and shallowness of this stream, the 1-percent light penetration depth was greater than the total depth of the stream. Therefore, it could not be determined if the dye reduced the compensation point >10 percent.

Table 12 also lists EPA domestic water supply quality criteria for chloride, iron, manganese, and nitrate plus nitrite levels. Since no portions of the Savannah River or its tributaries within the study area are classified or used for domestic water supplies (Tables 8, 9, and 10), these criteria will not be discussed.

Georgia, South Carolina, and EPA FC water quality criteria are listed in Tables 9, 10, and 12. The FC criterion for the portion of the Savannah River within the study area is <200/100 ml and is based on at least five samples over a 30-day period with maximums of 400 or 500/100 ml in no

greater than 10 percent of the samples. From the limited sampling performed during this study, the portion of the Savannah River within the study area generally meets the FC criterion, with concentrations generally much lower than the required levels (Table 7). On February 11, following the 7.1-cm rainfall on February 10 and 11, the FC levels at the lower stations approached or slightly exceeded the maximum allowable levels. However, these elevated levels appear to be transitory. If a larger number of samples had been taken over a span longer than 1 week, these elevated levels would probably have been <10 percent of the total number of the samples.

FC water quality criteria for the tributaries are 1,000/100 ml, based on a mean of at least 4 samples within a 30-day period. Maximum allowable FC concentrations for Georgia are 4,000/100 ml and for South Carolina they are not to exceed 2,000/100 ml in more than 20 percent of the samples examined during the 30-day period (Tables 9, and 10). Measured FC levels in the tributaries were within the Georgia and South Carolina water quality criteria during both February and July, based on the geometric mean of the six samples collected at each station within the week sampling periods in February and July. In February, some of the individual determinations approached or exceeded (geometric mean at Station 7 was 2,191/100 ml on February 11) the maximum allowable levels in the tributaries. Again, these elevated levels appear to be transitory in nature, due to the heavy (7.1-cm) rainfall on February 10, and would probably be <10 percent of the total samples had additional sampling been performed over a longer period of time in February.

Sediments

Complete sediment analyses results are presented in Appendix D for both the February and July sampling periods. Within the study area, the upstream reaches of the Savannah River are characterized by exposed bedrock. Coarse sandy sediments were found only in areas protected from heavy scour which occurred when water was released from Hartwell Dam

during periods of power generation. Farther downstream, and at all tributary stations, bottom sediments were predominantly sand with occasional areas of exposed bedrock or riffle areas.

Since sediment sampling was performed with a petite Ponar™ dredge, the samples obtained were semi-selective since they were collected only where a sample could be obtained. Although the sediment results may indicate a coarse sand bottom at a station, the riverbed could in fact be predominantly boulders and bedrock (e.g., Station 10) with only small areas of coarse sand. With the exception of the July sample at Station 11, all of the sediment samples which were obtained were classified as coarse sand with silt (<0.05 mm) and clay (<0.002 mm) fractions in these samples being <4 and 2 percent, respectively. The July sample at Station 11 would be classified as loam, with a silt fraction of 40 percent and 8 percent for clay.

As shown in Appendix D, TOC contents of all samples were low (0.03 to 0.18 percent), with no significant variation between stations or between sampling periods. Volatile solids were also low, ranging from 0.07 to 7.2 percent with a mean of 1.0 percent. Volatile solids were highest in the Station 11 (downstream of the Bigelow-Sanford Carpet Factory discharge) samples for both February and July sampling periods. Oil and grease contents of all samples were near or below the detection limit (0.1 percent total dry weight).

TKN in all samples ranged from <20 to 260 mg N/kg dry weight, with a mean of 69 mg N/kg. TKN levels were slightly higher in the tributaries than in the Savannah River, with the highest values found in July at Station 11 downstream of the Bigelow-Sanford Carpet Factory discharge. Total phosphorus in the sediment samples ranged from 27 to 410 mg P/kg, with a mean of 83 mg P/kg dry weight. Total phosphorus levels were slightly higher in Beaverdam Creek (Station 4) and Cedar Creek (Station 9) than in the Savannah River or the other tributaries within the study area. The highest total phosphorus levels were again found at

Station 11 in July. Since sediment sampling was not performed upstream of the Bigelow-Sanford Carpet Factory discharge, it is unknown if these elevated TKN and total phosphorus levels at Station 11 are directly related to the carpet factory discharge or if these levels are due to the difference in sediment type at this station.

Mean concentrations (mg/kg dry weight) of metals for all sediment samples collected at Stations 1 through 11 were as follows: arsenic, cadmium, and copper--$<$1.0 mg/kg; chromium, lead, nickel, and zinc--$<$10 mg/kg; mercury--$<$0.014 mg/kg; manganese--$<$350 mg/kg; and iron--$<$5,400 mg/kg. These values are not indicative of serious levels of heavy metal contamination in the sediments. Concentrations at Stations 1 through 10 for chromium, copper, mercury, and nickel generally were near or below the detection levels, with no significant variation found between the February and July sampling periods or between stations. Concentrations of copper, mercury, and nickel were higher at Station 11 downstream of the Bigelow-Sanford Carpet Factory discharge. Since sediment sampling was not performed upstream of the discharge, it is uncertain if these elevated levels are directly related to the Bigelow-Sanford Carpet Factory discharge. Since the silt and clay fractions of the sediment also were higher at Station 11 (Appendix D), the elevated heavy metal concentrations may simply reflect the higher adsorptive capacities of silt and clay as compared to the adsorptive capacity of coarse sand sediments. No consistent between-station trends were found in concentrations of arsenic, iron, lead, or manganese during either the February or July sampling periods. However, levels of these parameters generally were slightly higher in July than in February (Appendix D) at Stations 1 through 11. No consistent between-station trends were found in cadmium (Cd) concentrations, although concentrations were slightly higher at most stations in February than in July (mean of 0.38 and 0.22 mg Cd/kg dry weight in February and July, respectively).

February zinc (Zn) concentrations ranged from 1.2 to 6.1 mg Zn/kg dry weight (mean 3.4 mg Zn/kg), with only small variations found between

stations. Concentrations were higher in July and ranged from 1.4 to 63 mg Zn/kg (mean 13.9 mg Zn/kg), with the highest concentrations found downstream of the Bigelow-Sanford Carpet Factory at Station 11. In the Savannah River, replicate mean zinc levels were 23 mg Zn/kg just below Hartwell Dam in July and gradually declined downstream to 4.0 mg Zn/kg at Station 2. The concentration of zinc found in the sediments was higher just below the Richard B. Russell Dam site (10.6 mg Zn/kg at Station 1). The reason for the higher levels just downstream of the dams is unknown.

Although the variations in the abovementioned heavy metal concentrations appear to represent actual increases or decreases at the stations, part of the variation found may be due to the variation in sample particle sizes from one station or sampling period to the next. At Station 11, iron concentrations were 5,100 and 30,500 mg Fe/kg dry weight (replicate means) in February and July, respectively. However, at least part of this variation is probably due to the greater percentage of silt and clay in the July samples (Appendix D), which have higher adsorptive capacities for iron than do coarse sand sediments.

Pesticide and PCB concentrations (Appendix D) were below the detection levels in all of the sediment samples from both the February and July sampling periods.

Periphyton

Detailed results for the February and July periphyton collections are presented in tabular form in Appendix E. Table 13 summarizes this data by major algal divisions present at each sampling location.

Generally, sampling with the use of Periphytometers™ or other artificial substrates is advantageous since the collections are representative of water quality over a period of time (usually 2 to 4 weeks) versus phytoplankton sampling which is indicative of the algae present at that particular time and location only. Periphytometers™ are especially useful when sampling a uniform system (such as a large reservoir or

Table 13. Richard B. Russell Preimpoundment Study—Summary of Periphyton Counts by Major Division Collected February 9 through 13 and July 13 through 15, 1981

Taxa	Savannah River Stations					Tributary Stations						Mean for All Stations
	1	2	6	8	10	3	4	5	7	9	11	
February												
Cyanophyta												
Cells/mm^2	177	93	1	25	1	8	52	4	369	0	1	67
Percent	10	33	37	40	5	19	2	11	19	0	9	9
Chlorophyta												
Cells/mm^2	315	46	1	12	1	2	3	1	231	7	51	56
Percent	18	16	20	19	6	5	0	3	12	0	4	8
Cryptophyta												
Cells/mm^2	0	0	0	0	0	0	0	0	0	0	0	0
Percent	0	0	0	0	0	0	0	0	0	0	0	0
Chrysophyta												
Bacillariophyceae												
Cells/mm^2	1,258	146	2	26	19	34	2,040	31	1,361	1,608	12	594
Percent	72	51	43	41	89	76	97	87	69	100	87	83
Englenophyta												
Cells/mm^2	0	0	0	0	0	0	0	0	0	0	0	0
Percent	0	0	0	0	0	0	0	0	0	0	0	0
Pyrrhophyta												
Cells/mm^2	0	1	0	0	0	0	0	0	0	0	0	0
Percent	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL FEBRUARY												
Cells/mm^2	1,750	285	4	63	21	44	2,095	36	1,961	1,615	64	717

Table 13. Richard B. Russell Preimpoundment Study—Summary of Periphyton Counts by Major Division Collected February 9 through 13 and July 13 through 15, 1981 (Continued, Page 2 of 2)

Taxa	Savannah River Stations					Tributary Stations						Mean for All Stations
	1	2	6	8	10	3	4	5	7	9	11	
July												
Cyanophyta												
Cells/mm^2	3,281	2,542	10,336	2,309	358	—	13	31	157	225	5	1,926
Percent	31	27	77	41	49	—	1	31	24	91	2	46
Chlorophyta												
Cells/mm^2	130	39	285	119	79	—	13	7	19	1	139	83
Percent	1	0	2	2	11	—	1	7	3	0	50	2
Cryptophyta												
Cells/mm^2	0	0	0	0	0	—	0	0	0	0	0	0
Percent	0	0	0	0	0	—	0	0	0	0	0	0
Chrysophyta												
Bacillariophyceae												
Cells/mm^2	7,029	6,666	2,879	3,141	300	—	1,106	61	466	20	6	2,167
Percent	67	72	21	56	41	—	98	62	73	8	2	52
Euglenophyta												
Cells/mm^2	0	0	0	0	0	—	0	0	0	0	124	0
Percent	0	0	0	0	0	—	0	0	0	0	45	0
Pyrrhophyta												
Cells/mm^2	0	0	0	0	0	—	0	0	0	0	0	0
Percent	0	0	0	0	0	—	0	0	0	0	0	0
TOTAL JULY Cells/mm^2	10,440	9,247	13,500	5,569	737	—	1,132	99	642	246	274	4,176

Source: WAR, 1981.

river) where the samplers can be placed under nearly identical physical conditions of light, current velocity, etc. Under these conditions, one can be almost certain that any variation found between the samplers is primarily due to variations in water quality between sampling locations.

In this study, however, sampling locations varied from small creeks <2 meters wide (such as at Station 11, Figures 1 and 31) to the Savannah River which was approximately 200 to 300 meters wide. Under these varying conditions it was impossible to place all samplers under identical physical conditions. Therefore, between-station comparisons of the data in Appendix E are extremely difficult and complex. Even within the Savannah River there was considerable variation (particularly in water velocity, flow, and temperature) between the upstream and downstream stations.

Generally, the optimum temperatures for diatoms are between 18 and 30°C; optimum temperatures for green algae are between 30 and 35°C, and optimum temperatures for blue-green algae are between 35 and 40°C (Cairns, 1956). During both the February and July sample collection periods, all of the measured water temperatures were <30°C (Appendix B) and diatoms (Bacillariophyceae) generally accounted for the greatest percentage of all algal divisions present in each sample (Table 13). The exceptions to this were Stations 6, 9, and 11 in July. Station 6 on the Savannah River and Station 9 on Cedar Creek were dominated by blue-green algae (Cyanophyta) which made up 77 and 91 percent of the assemblages, respectively. The most abundant taxa at these two stations were unidentified species of Lyngbya and Oscillatoria which had very small cells generally 2 micrometers (um) long and 2 to 5 um wide. Many of the filamentous green and blue-green algae found on the samplers were immature (due to the short incubation time) and accurate identifications of the species were tenuous, particularly for the genera Ulothrix and Stigeoclonium.

Station 11 (downstream of the Bigelow-Sanford Carpet Factory discharge) had very few euperiphytic species present in July. Instead, the most

abundant algae present were Chlorophyta (50 percent), with most of the genera more characteristic of phytoplankton (e.g., Ankistrodesmus, Chodatella, and Scenedesmus) than of periphyton. A large percentage (45 percent) of the algal association were Euglenophyta, which are also characteristically planktonic or tychoplanktonic. The reason for the lack of periphytic species at this station is not certain.

Cell densities in the Savannah River were lowest just below Hartwell Dam (2,148 and 73,659 cells/cm^2 in February and July, respectively) and gradually increased downstream (except at Station 6) to Station 1 just below Richard B. Russell Dam site (175,065 and 1,043,963 cells/cm^2 in February and July, respectively). Variation in water velocity past the Periphytometers™ probably accounts for this cell density gradient. Hartwell Dam periodically releases large volumes of water during periods of power generation. Due to the narrow riverbed just below Hartwell Dam, the water velocity increases rapidly to 0.75 to 1.1 meters per second (see Introduction). As the surge front diffuses and the riverbed becomes wider downstream, the water velocity decreases (assuming a uniform riverbed gradient at the sampling locations).

Water movement past Periphytometers™ continually renews essential materials and removes metabolic cellular byproducts. In standing water, a definite zone of depletion occurs around the cells and this zone becomes limiting. Water velocities greater than 15.24 cm per second (0.5 foot per second) effectively decrease this depletion zone, thereby reducing its limiting effect and increasing productivity (Weitzel, 1979). At excessive water velocities, however, periphytic growth can become inhibited due to the scouring action of the water (particularly if there is sand in suspension). Therefore, due to the periodically high water velocities just below Hartwell Dam, a decrease in cell densities is not unusual. In addition, most of the species found at this location grow attached by holdfasts or gelatinous pads or stalks such as Spirogyra, Stigeoclonium, Achnanthes, and Gomphonema or they can easily become entangled among the euperiphytic growth such as Lyngbya, Oscillatoria,

Asterionella, *Synedra*, and *Tabellaria*. The reason or cause for the lowest density in February and the highest density in July being found at Station 6 is unknown.

A comparison of the cell densities in the tributaries in February to those in July (Table 13) shows slightly higher densities in July in both Coldwater Creek (Station 5) (3,541 and 9,938 cells/cm^2 in February and July, respectively) and at Station 11 (1,351 and 27,817 cells/cm^2 in February and July, respectively). This is to be expected since algal productivity of streams is usually higher in the summer, due to increased water temperatures, than in the winter. However, in Beaverdam Creek (Station 4), Little Generostee Creek (Station 7), and Cedar Creek (Station 9), the cell densities were lower in July than in February; water quality (Appendix C), *in situ* measurements (Appendix B), or water velocity (Appendix B) do not account for this. Water velocity was higher in the streams in February during the wet period than in July. Therefore, any scouring action and corresponding reduction in productivity would have been greater in February. In July, stream current was sufficient (usually >15 cm per second) to reduce any nutrient depletion zones around the cells, which would have limited production. The primary factor for the decrease in cell densities in July at these stations may be available light, since trees line both banks of these creeks. In the winter, with most of the foliage off the trees, much light penetrated to the creek beds. However, in the summer the trees shaded the creekbeds and there may have been an actual reduction in the amount of light reaching the Periphytometers™.

Most of the diatom species found during this study are characteristic of circumneutral-to-acidic water of low mineral content (Lowe, 1974; Patrick and Reimer, 1966, 1975). The majority of the planktonic diatom species normally found in lakes or slow-moving water, which were encountered during this study (*Gomphonema gracile*, *Synedra delicatissima*, *S. rumpens*, *S. tenera*, and the planktonic strain of *Tabellaria flocculosa* var. *flocculosa* (Strain III p, Koppen, 1975), were found predominately in the

Savannah River just below Hartwell Dam at Stations 8 and 10. Asterionella formosa, another planktonic species which prefers cool water (Werner, 1977), was found on the Periphytometers™ only in February at Stations 2 and 10 on the Savannah River. These planktonic species were probably abundant in Hartwell Lake at the time of collections, discharged during periods of power generation, and as they drifted downstream, were entrapped in the Periphytometers™.

Another diatom species of interest is Navicula simula, which Patrick and Reimer (1966) state as being known only from the type locality (South Carolina, Aiken County, Savannah River between Miles 174.8 and 175.1 from the mouth) which is 100 miles downstream of the Richard B. Russell Dam site. During this study, N. simula was found in the Savannah River (Station 6), Cedar Creek (Station 9), and Station 11 (downstream of the Bigelow-Sanford Carpet Factory discharge). This would extend the known range for this species approximately 125 miles up the Savannah River. Ecologically, Patrick and Reimer (1966) state that N. simula is characteristic of water with low mineral content. Since the measured conductivities during this study were low (overall mean of 55 umhos/cm at 25°C for water quality sampling), finding N. simula at these locations (Stations 6, 9, and 11) would not be unusual.

In their recent publication, Taylor, et al. (1980) present a table of 134 species and genera of algae which are associated with eutrophication in lakes throughout the eastern and southeastern United States. Table 14 lists the taxa associated with eutrophication, which were found during this study, and summarizes their distributions within the study area. These species were generally found in low cell densities (Appendix E), with the total number of eutrophic taxa at each station ranging between 9 and 13 (Table 14). While these taxa are characteristically present in eutrophic waters, many are also frequently found in moderately enriched waters and a few even in unenriched waters. Taylor, et al. (1980) define unenriched, moderately enriched, and highly enriched waters by categories of total phosphorus levels equal to <0.025, 0.025 to 0.050, and

Table 14. Richard B. Russell Preimpoundment Study—Diatom Species Found During the Study Which are Associated with Eutrophication

Taxa	Station 1	2	3	4	5	6	7	8	9	10	11
Asterionella formosa		P								P	
Cyclotella meneghiniana											P
C. stelligera		P				P				P	P
Gomphonema angustatum	X	X	P	P	P	X	P	X	P	P	P
G. parvulum	X	X	P	X	P	X	X	X	X	P	P
Gyrosigma acuminatum				P			P				P
Melosina ambigua	P	P						P		P	
M. varians	P	P		X	P	P	X	P			
Meridion circulare			P		P	P					P
Navicula cryptocephala	P		P	P		P	P	P	X		P
N. rhynchocephala									X		
N. tripunctata							P				
Nitzschia acicularis	P	P	P	P	P	P	X	P		P	
N. dissipata						P	P		P		
N. fonticola	P	P				P	P		P		
N. palea	P		P	P	P		P	P	P		P
Synedra delicatissima	X	P	P	P	P	P	P	P		P	
S. pulchella	X	P	P	P	P	P	P	P	P	P	P
S. ulna	P	P	P	X	P	X	X	P	P	P	P
TOTAL NUMBER OF TAXA	11	11	9	10	9	12	13	10	9	9	10

Notes: P = Present.
X = More than 10,000/cm^2.

Source: WAR, 1981.

>0.050 mg P/l, respectively. Assuming that these levels established for lakes in the southeastern United States would also approximately be applicable to flowing waters, comparisons of the total phosphate levels at each of the stations (see Appendix C) would indicate that in February the Savannah River stations could be classified as unenriched prior to the heavy (7.1-cm) rainfall on February 10 and 11. Rocky River, Coldwater Creek, and Little Generostee Creek also could be classified as unenriched, while Beaverdam Creek and Cedar Creek could be classified as moderately to highly enriched. In July, the Savannah River varied considerably in phosphate levels dependent on the discharges. Based on the limited sampling performed during this preimpoundment study, Rocky River, Coldwater Creek, and Little Generostee Creek could still be classified as unenriched to moderately enriched, while the remainder of the stations would be classified as highly enriched waters.

In addition to variations in water velocity, flow, and amount of shading at the periphyton sampling locations, variations in phosphate levels may also partially account for the periphyton density variations found on the Periphytometers™. At Stations 8 and 10 (just downstream of Hartwell Dam), the total phosphate levels were generally <0.01 mg P/l. The low cell densities found at Stations 8 and 10 may be the result of the phosphate content of the water, if the periphyton were phosphate-limited. Likewise, the low phosphate levels that were found in Rocky River and Coldwater Creek might also partially explain the fact that the lowest cell densities in the tributaries were found in these two streams.

Macroinvertebrates

Complete macroinvertebrate data for Hester-Dendy and benthic sampling are presented in Appendix F and summarized by major groups in Tables 15 and 16, respectively. Summary tables for Shannon-Weaver Diversity Indices and biomass estimates for benthic and Hester-Dendy samples, for both February and July 1981, are also presented in Appendix F.

Table 15. Richard B. Russell Preimpoundment Study--Summary of Macroinvertebrate Hester-Dendy Data by Major Group--Collected February 9 through 13 and July 13 through 15, 1981

Taxa	Savannah River Stations*				Tributary Stations					
	1	2	8	10	3	4	5	7	9	11
February										
Oligochaeta										
No./m^2	72	32	0	0	0	381	0	191	309	8
Percent	8	6	0	0	0	15	0	31	19	7
Plecoptera										
No./m^2	8	87	0	0	0	8	143	16	24	0
Percent	1	15	0	0	0	0	17	3	1	0
Ephemeroptera										
No./m^2	8	0	0	0	72	71	635	0	135	16
Percent	1	0	0	0	10	3	74	0	8	13
Odonata										
No./m^2	0	0	0	0	0	0	0	0	0	0
Percent	0	0	0	0	0	0	0	0	0	0
Trichoptera										
No./m^2	0	0	0	0	8	40	8	0	0	0
Percent	0	0	0	0	1	2	1	0	0	0
Coleoptera										
No./m^2	0	16	0	0	0	0	8	0	0	0
Percent	0	3	0	0	0	0	1	0	0	0
Diptera Chironomidae										
No./m^2	786	429	302	95	651	1,952	64	388	1,128	87
Percent	90	76	97	100	87	80	7	65	71	73
Minor Taxa										
No./m^2	0	0	8	0	16	8	0	8	24	8
Percent	0	0	3	0	2	0	0	1	1	7
Total No./m^2	874	564	310	95	747	2,460	858	603	1,620	119

* No organisms were found on sampler at Station 6.

Table 15. Richard B. Russell Preimpoundment Study--Summary of Macroinvertebrate Hester-Dendy Data by Major Group--Collected February 9 through 13 and July 13 through 15, 1981 (Continued, Page 2 of 2)

Taxa	Savannah River Stations 1	2	6	8	10	Tributary Stations† 4	5	7	9	11
July										
Oligochaeta										
No./m^2	1,385	192	1,230	54	69	178	24	23	185	1,184
Percent	58	8	60	5	17	26	6	3	7	49
Plecoptera										
No./m^2	8	0	0	0	0	8	54	0	0	0
Percent	0	0	0	0	0	1	13	0	0	0
Ephemeroptera										
No./m^2	8	100	0	8	0	62	107	8	607	15
Percent	0	4	0	1	0	9	26	1	24	1
Odonata										
No./m^2	0	0	0	0	0	0	8	0	0	0
Percent	0	0	0	0	0	0	2	0	0	0
Trichoptera										
No./m^2	23	716	0	31	0	16	39	39	454	0
Percent	1	30	0	3	0	2	9	7	18	0
Coleoptera										
No./m^2	0	0	0	0	0	0	0	0	139	0
Percent	0	0	0	0	0	0	0	0	6	0
Diptera Chironomidae										
No./m^2	907	1,320	686	1,008	331	408	146	563	1,022	1,215
Percent	38	56	34	90	83	59	35	86	41	50
Minor Taxa										
No./m^2	69	39	116	8	0	23	39	23	108	0
Percent	3	2	6	1	0	3	9	3	4	0
Total No./m^2	2,400	2,367	2,032	1,109	400	695	417	656	2,515	2,414

† Sampler not recovered at Station 3.

Source: WAR, 1981.

Table 16 Richard B. Russell Preimpoundment Study--Summary of Macroinvertebrate Benthic Data by Major Group--Collected February 9 through 15 and July 13 through 15, 1981

Taxa	Savannah River Stations					Tributary Stations					
	1	2	6	8	10	3	4	5	7	9	11
February											
Oligochaeta											
No./m^2	3	0	52	102	1,091	11	1,110	8	8	24	19
Percent	0	0	3	38	45	2	12	1	3	39	35
Plecoptera											
No./m^2	3	0	0	0	0	11	19	267	14	0	0
Percent	0	0	0	0	0	2	0	29	4	0	0
Ephemeroptera											
No./m^2	0	0	0	0	0	0	19	6	30	3	0
Percent	0	0	0	0	0	0	0	1	10	5	0
Odonata											
No./m^2	0	0	0	0	0	0	0	0	8	0	0
Percent	0	0	0	0	0	0	0	0	3	0	0
Trichoptera											
No./m^2	0	0	0	0	0	0	84	0	3	3	0
Percent	0	0	0	0	0	0	1	0	1	5	0
Coleoptera											
No./m^2	0	0	0	0	0	0	5	0	3	0	0
Percent	0	0	0	0	0	0	0	0	1	0	0
Diptera Chironomidae											
No./m^2	43	3	97	138	1,259	357	7,446	143	231	24	36
Percent	4	14	5	51	52	69	81	15	75	39	65
Minor Taxa											
No./m^2	1,024	18	1,612	29	85	137	510	504	12	8	0
Percent	96	86	92	11	3	27	6	54	3	12	0
Total No./m^2	1,073	21	1,761	269	2,435	516	9,193	928	309	62	55

Source: WAR, 1981.

Table 16. Richard B. Russell Preimpoundment Study--Summary of Macroinvertebrate Benthic Data by Major Group--Collected February 9 through 15 and July 13 through 15, 1981 (Continued, Page 2 of 2)

Taxa	Savannah River Stations					Tributary Stations					
	1	2	6	8	10	3	4	5	7	9	11
July											
Oligochaeta											
No./m^2	17	38	626	4,299	20	48	1,527	394	263	617	10,934
Percent	9	6	71	91	38	5	26	34	10	31	93
Plecoptera											
No./m^2	0	0	0	0	0	0	0	0	0	0	0
Percent	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera											
No./m^2	0	0	8	0	0	0	27	0	8	22	0
Percent	0	0	1	0	0	0	0	0	0	1	0
Odonata											
No./m^2	0	0	0	3	0	0	5	3	41	0	5
Percent	0	0	0	0	0	0	0	0	1	0	0
Trichoptera											
No./m^2	0	0	5	0	3	0	51	6	218	65	3
Percent	0	0	1	0	6	0	1	1	8	3	0
Coleoptera											
No./m^2	0	0	0	0	0	0	6	0	17	0	6
Percent	0	0	0	0	0	0	0	0	1	0	0
Diptera Chironomidae											
No./m^2	0	159	39	282	9	345	4,167	470	1,990	1,12[illegible]	563
Percent	0	25	4	6	18	32	72	40	74	57	5
Minor Taxa											
No./m^2	162	448	200	133	20	661	46	293	153	135	261
Percent	91	69	23	3	38	63	1	25	6	7	2
Total No./m^2	179	645	878	4,717	52	1,054	5,829	1,166	2,690	1,963	11,772

Source: WAR, 1981.

In this study, the benthic substrates at most sampling sites were composed of a soft mixture of sand and small gravel. This was the only type of substrate sampled. However, substrates of Stations 6, 8, and 10 were largely composed of boulders and bedrock. Therefore, benthic samples may not adequately represent the benthic communities at these stations.

Benthic samples were dominated by flatworms (Rhabdocoela), oligochaetes, and chironomids. Multiplate samplers, however, provided habitat for more Ephemeroptera, Trichoptera, and Plecoptera than did the natural substrates. Sand and small gravel is a favorable habitat for vermiforms. Small worm-like organisms occupy the very small interstitial spaces (McIntyre, 1969), whereas larger organisms tend to cling or attach themselves to more coarse and stable substrates where more prominent spaces are available. Perhaps this explains why Plecoptera and Ephemeroptera were found lodged on the multiplate samplers more frequently and in greater numbers than in the soft sandy substrate. However, the burrowing Odonates (*Progomphus obscurus*, *Lanthus* sp., and *Gomphus* sp.) and the burrowing mayfly (*Ephemera* sp.) were found more commonly in the petite Ponar™ grab samples. These qualitative differences between Ponar™ and multiplate samples are well documented (Tsui and Breedlove, 1978).

Hester-Dendy density estimates were usually lower than Ponar™ estimates as the soft substrate provided a more heterogeneous environment with more available surface area. Hester-Dendy biomass, however, was often greater due to higher numbers of Ephemeroptera, Trichoptera, and Plecoptera. When all stations were taken into account, average density and biomass were considerably higher during July; but, when stations are analyzed individually, this trend is sometimes reversed. Generally, diversity was higher in the summer (overall mean 2.731) than in the winter (overall mean 1.619), primarily reflecting an increase in species richness (12 to 19 species/station).

The oligochaetes consisted primarily of tubificids (*Limnodrilus hoffmeisteri* and *Ilyodrilus templetoni*) and naidids (*Nais* spp.). Individuals

belonging to the tubificids are considered by many investigators to be indicators of water quality. Often tubificids strongly dominate benthic communities of organically enriched waters. Thus, tubificids may be utilized to detect the source, nature, and degree of pollution [provided the establishment of accurate identities at the species level (Brinkhurst, 1966)]. Inherent in the tubificids ability to withstand high rates of organic loading is their toleration of low dissolved oxygen concentrations. High BOD is the limiting factor for most benthic invertebrates in organically polluted systems.

The February midge fauna was dominated by Cricotopus-Orthocladius group, Cryptochironomus fulvus group, Polypedilum halterale, and Robackia demeijerea, whereas July samples exhibited a more varied predominance of Cricotopus spp., Cryptochironomus fulvus group, Polypedilum convictum, Polypedilum scalaenum, Robackia demeijerea, Tanytarsus guerlus group, Rheotanytarsus exiguus group, and Cladotanytarsus sp. Most of these forms, especially the Chironominae, can tolerate low-to-moderate dissolved oxygen levels and high nutrient concentrations. Some tolerate high levels of organic and toxic compounds, and others do not. These qualities give the Chironomidae value as biological indicators of escalated organic loading and toxic waste problems.

Although some chironomid larvae (i.e., Tanypodinae) are active predators when favorably sized food items (i.e., oligochaetes and other chironomids) are available (Baker and McLachlan, 1979), most are benthic scavengers (Beck, 1977). Numerous predators, including adult fish and other benthic macroinvertebrates (i.e., Plecoptera and Odonata), rely heavily upon chironomid larvae as a food source. Thus, the chironomids have a considerable influence on nutrient turnover rate and trophic dynamics.

Diversity (i.e., the degree of species variation within a system) is generally determined by two factors: (1) species richness (the total number of species), and (2) the number of individuals within each species present. Diversity is positively correlated with the number of species.

The lowest diversity occurs if all organisms belong to the same species and the highest value is reached when each organism belongs to a different species. Although diversity indices were originally intended for terrestrial systems, they are presently adapted and applied to aquatic systems. The index most commonly used, and the one chosen for this study, is the Shannon-Weaver Species Diversity Index.

Diversity indices can be useful in estimating stress imposed upon a given macroinvertebrate community. Most "clean" aquatic systems exhibit many taxa with few individuals, and only a few taxa of abundance. Induced stress on a community usually lowers diversity by making the environment less favorable for certain species; the same stress may lend a competitive advantage to other species. Therefore, as is often the case with organically polluted systems, the number of species may decrease as total productivity increases. Contrarily, siltation and induced toxic substances often create a decrease in both the number of taxa and the number of individuals.

Most stress-free systems exhibit a Shannon-Weaver value between 3 and 4 (Wilhm, 1970), whereas stressed systems commonly range from <1 to 2. However, interpretation of low values must be exercised with caution as low-diversity communities do occur naturally (i.e., without the aid of man).

The substrate at Station 1, just below the Richard B. Russell Dam site, was largely composed of shifting sand and silt. July Benthic Sample 1-A contained much clay and no organisms were detected. At Station 1, heavy sand and silt loads were presumably due to disturbances during construction of the Richard B. Russell Dam. This may explain the low biomass (0.0436 gram/m^2), density (179/m^2), and diversity (0.627) estimates in the July benthic samples. Hester-Dendy samples did not reflect the detrimental effects of siltation. Plecoptera and Ephemeroptera were represented in February, but not in July (Tables 15 and 16). The presence of <u>Robackia demeijerea</u>, <u>Corynoneura celeripes</u>, and <u>Thienemanniella</u>

xena is indicative of waters free of organic wastes. Beck (1977) lists all three species as rheobiontic and saprophobic.

Shifting sand and silt also comprised a large percent of the substrate at Station 2. February benthic samples from this site exhibited extremely low diversity (0.723), density (21/m^2), and biomass (0.006 gram/m^2). Benthic diversity was higher in July (2.099), probably reflecting a greater species richness with increasing temperatures. Hester-Dendy diversity values were slightly higher (mean 2.202) than the benthic diversity values (mean 1.411). Perhaps the multiplate samplers enabled the organisms inhabiting them to avoid the rather harsh shifting sand and silt habitat. The presence of Robackia demeijerea and Corynoneura taris indicate the lack of organic pollution. The elmid beetles, Macronychus sp. and Stenelmis sp., were collected in February. Sinclair (1964) found that Macronychus glabratus is sensitive to sewage and various industrial wastes. However, some species of Stenelmis are facultative in regard to such wastes. Trichoptera and Ephemeroptera were present, but Plecoptera were not represented at Station 2 (Tables 15 and 16).

Substrate at Rocky River (Station 3) was comprised of sand and small gravel. Diversity increased from a mean of 1.644 in February to 2.467 in July. Plecoptera, Ephemeroptera, and Trichoptera were present only in February during colder temperatures and greater flow rates (Tables 15 and 16). However, it should be noted here that no multiplate sample was retrieved from the site in July. The Asiatic clam (Corbicula fluminea) was abundant and added a great deal to the extremely high biomass (15.017 grams/m^2). Excluding Corbicula, biomass was relatively low (0.1815 gram/m^2). Again the presence of Corynoneura spp., Robackia demeijerea, and Nilotanypus sp. [another saprophobic midge (Simpson and Bode, 1980)], suggested that Rocky River was relatively free of excessive organics.

Beaverdam Creek (Station 4) substrates consisted of coarse sand and small gravel. Biomass and density were higher in the benthic samples due to

large numbers of a variety of chironomids and oligochaetes associated with the natural substrate. It is also interesting to note that both density and biomass were higher in the winter (mean density and biomass were 5,826 and 1.820/m^2, respectively) than in the summer (mean density and biomass were 3,264 and 1.652/m^2, respectively). Diversity increased from a mean value of 1.989 in February to 3.570 in July. Although species richness was quite high in February, diversity was driven down by large numbers of Cricotopus-Orthocladius and Nais elinguis. Generally, the Beaverdam Creek fauna was very well balanced, with representatives from each major insect group. The midge fauna was comprised of an assortment of facultative species such as the predatory Cryptochironomus fulvus group, Dicrotendipes neomodestus (which is often associated with waters rich in organics and nutrients), and Polypedilum spp. Also present were the clean water forms, Robackia, Corynoneura, Nilotanypus, and Thienemanniella xena.

Benthic samples at Coldwater Creek (Station 5) were comprised of coarse sand and small gravel. Much grading and clearing activity was in process at the south bank at this site; consequent siltation could dramatically change the benthic fauna. Diversity was moderately low in February (mean 1.586), but increased to relatively high values in July (mean 3.473). Biomass also was higher during the summer (mean 2.54 grams/m^2) than the winter (mean 0.717 gram/m^2). Station 5 exhibited a well balanced fauna with the Trichoptera, Ephemeroptera, and Plecoptera well represented (Tables 15 and 15). Additionally, Corynoneura, Robackia, and Nilothauma babiyi were collected at this site. Simpson and Bode (1980) found N. babiyi in swift-flowing pollution-free streams where species richness was >30 and diversity values surpassed 3.0. The Megaloptera, Corydalus cornutus, was fairly abundant and Beck (1954) found this species to be intolerant of organic waste materials. Generally, the Coldwater Creek fauna is that of a cold, pristine, rheocrene environment.

The substrate in the Savannah River at Station 6 was primarily bedrock with a few scattered boulders. Soft sediments were rare and consisted of gravel and coarse sand. Diversity was low in February (mean 0.753), but increased with warmer temperatures to a mean of 2.925 in July. Enchytraeids (Lumbricillus sp.), naidids, and Chironomidae comprised the greatest percent of the benthic fauna. Other groups were not well represented. However, the lack of organic pollution is again suggested by the presence of Robackia demeijerea, Nilothauma babiyi, and Potthastia longimanus. P. longimanus was designated by Beck (1977) as saprophobic. The incomplete benthic community may be attributable to the substrate type and frequent water-level fluctuation.

Little Generostee Creek (Station 7) had sediments of coarse sand and small gravel. Heavy construction was underway just downstream of the sampling site. Although this did not affect the area sampled in this study, considerable siltation was evident just below the site. Diversity values were indicative of a healthy fauna in both February (mean 3,163) and July (mean 3.66). An abundance of Polypedilum convictum suggests that these waters were rich in suspended organic foodstuffs (Simpson and Bode, 1980). Many facultative midge species were collected, but relatively intolerant species were also present. Generally, this was a stable and well-balanced community.

The principal substrates in the Savannah River at Station 8 were boulders and bedrock; interspersed among these were small areas of coarse sand and gravel. Hester-Dendy diversity values were low during February (0.464) and July (0.717). July benthic diversity (1.992) was lower than that of February (2.971) even though species richness increased. This was primarily due to an abundance of Lumbricillus sp. in July. Density (February mean 289/m^2; July mean 2,913/m^2) and biomass (February mean 0.479 grams/m^2; July mean 1.954 grams/m^2) increased from February to July. The fauna was primarily composed of facultative species with a few intolerant species. Ephemeroptera and Trichoptera were present, but sparsely populated. No Plecoptera were collected (Tables 15 and 16).

The Hester-Dendy population estimates were probably limited by the daily fluctuations in discharge from the Hartwell Dam.

Cedar Creek (Station 9) sediment consisted of coarse sand and gravel. Diversity was moderate (mean 2.149) in winter months, but increased to a mean of 3.537 in July. Density (February mean 841; July mean 2,239/m^2), biomass (February mean 0.338; July mean 6.157 grams/m^2), and species richness (February mean 11; July mean 33) dramatically increased between the February and July sampling periods. Macronychus sp. and Ancyronyx sp., elmids proclaimed by Sinclair (1964) to be sensitive to sewage and industrial wastes, were collected at Station 9. A great variety of other intolerant organisms were present including Cryptotendipes sp., Robackia demeijerea, Corynoneura, Thienemanniella xena, Potthastia longimanus, and Corydalus cornutus. Every major aquatic insect group was well established (Tables 15 and 16). All of the above qualities suggest a very "healthy" benthic community.

Sediments in the Savannah River at Station 10 were rare, but were present in blasted channels directly downstream of large boulders. Since the riverbed was primarily bedrock and boulders at Station 10, the benthic samples collected at Station 10 were not truely representative of the bottom since the samples were collected only where sediments were found. In addition, July Benthic Sample 10-D was collected from a sandbar downstream of a small tributary. Diversity values were somewhat low in February (mean 1.364), but July values were higher (mean 2.846). Densities (overall mean 745/m^2) and biomass (overall mean 0.234 gram/m^2) values also were relatively low. Benthic samples showed a decrease in species richness from February (23) to July (12). Trichoptera were sparse and no Plecoptera or Ephemeroptera were detected (Tables 15 and 16). The benthos were primarily comprised of facultative chironomid midge larvae. Large fluctuations in river flow and low temperatures as a result of hypolimnetic discharges from the Hartwell Dam, may have been

the primary detrimental factors influencing the benthic community at Station 10.

Station 11 was subject to heavy siltation. Sediments were composed of a layer of fine red silt overlying a layer of anoxic black sapropel. Although species richness in the natural substrate increased from February to July, diversity decreased to 0.645 due to extremely large numbers of tubificids. Benthic biomass (February 0.028, July 4.594 grams/m^2) and density (February 87, July 11,772/m^2) also dramatically increased. High density is often associated with organically enriched environments. However, high densities do occur "naturally" during the reproductive cycles of certain invertebrates. The benthic community at Station 11 was dominated by tubificids, the saprophilic midge larvae, Psectrotanypus dyari, and other facultative midges including Polypedilum spp., Chironomus sp., and Conchapelopia sp. Species intolerant of low oxygen and high organic loading were absent. Epheremeroptera and Trichoptera were rare and no Plecoptera were collected (Tables 15 and 16). This benthic community is one adapted to an area of heavy siltation, low oxygen, and a high rate of organic loading. This conclusion is further supported by high BOD, COD, phosphate, and TOC values (Appendix C).

Tissues

Complete tissue analyses results for the April through May and July through August tissue sampling periods are presented in Appendix G. All concentrations are presented on a wet weight basis. In order to facilitate discussion, tissue results will be presented by the following major groups of organisms: insect larvae, crayfish, surface fish, and bottom fish.

Insect Larvae--Chemical analyses results for the insect larvae sampling periods are presented in Appendix G, Table G-1. Due to insufficient sample volume, heavy metal analyses are incomplete for the April through May insect larvae sampling period. However, all organic analyses for

organochlorine pesticides and PCBs are complete. The results of the heavy metal analyses for the May and July caddisfly larvae sampling in the Savannah River at Stations 2, 6, and 8 indicate that levels of arsenic, cadmium, and selenium were near or below the respective detection levels (0.50, 0.05, and 0.50 mg/kg, respectively) at all sampling locations. No consistent trends were noted for chromium, lead, or mercury due to the incomplete data and the variation in replicate analyses results. Chromium levels ranged from <0.05 mg/kg to 18.00 mg/kg (Station 6 in May). Lead concentrations ranged from below the detection level (0.05 mg/kg) to 2.8 mg/kg (Station 8 in July) and mercury levels varied from below the detection limit (0.006 mg/kg) to 0.880 mg/kg (Station 2 in May). However, due to the incomplete data and the variation between sample replicates (caused in part by the small sample volumes used during analyses), it is uncertain if the abovementioned elevated levels represent actual levels or are normal between sample variation. Zinc concentrations were relatively uniform in the caddisfly larvae collected in the Savannah River, with values ranging from 15.0 to 41.0 mg/kg (overall mean 26.0 mg/kg). Concentrations of organochlorine pesticides and PCBs in the insect larvae collected in the Savannah River were generally below the detection limits in both May and July, except for levels of BHC, P'P' DDE, heptachlor, and PCB. Except for BHC, concentrations of these parameters were highest in caddisfly from Station 6, based on the limited analyses performed. BHC-alpha isomer levels ranged from <1.0 to 16.0 micrograms/kilogram (ug/kg) (Station 8 in July). Concentrations of P'P' DDE, heptachlor, and PCB-Aroclor 1254 ranged from 10 to 46 ug/kg, 4 to 10 ug/kg, and 61 to 170 ug/kg, respectively, with the highest concentrations of each found in the May tissue samples from Station 6. The reason for these elevated levels at Station 6 (compared to the levels at Stations 2 and 8) is uncertain, but may be due to an increase in agricultural runoff in this area.

In July, cranefly larvae (Tipula sp.) also were collected at Station 8. Heavy metal and organochlorine pesticide concentrations were lower in the Station 8 cranefly larvae than in the caddisfly larvae. All chemical

concentrations were near or below the detection levels except lead (0.46 mg), zinc (11.0 mg/kg), BHC-alpha isomer (6.0 ug/kg), P'P' DDE (9.0 ug/kg), heptachlor (5.0 ug/kg), and PCB-Aroclor 1254 (62 ug/kg). These lower concentrations are probably related to a difference in food preference between caddisfly and cranefly larvae.

In Beaverdam Creek (Station 4) and Little Generostee Creek (Station 7), heavy metal concentrations in the hellgrammite larvae were generally near or below the detection limits with the exception of zinc. Zinc levels were comparable to levels found in the caddisfly larvae in the Savannah River with values ranging between 22 and 43 mg/kg at Station 4 and from 29 to 30 mg/kg at Station 7. At these tributary stations, organochlorine pesticide and PCB concentrations in the hellgrammites were all below the detection levels except for chlordane (34.0 ug/kg, Station 4 in April) and P'P' DDE. Hellgrammite tissue concentrations of P'P' DDE were 27.0 and 6.0 ug/kg at Station 4 in April and July, respectively, and in hellgrammites from Little Generostee Creek the P'P' DDE levels were 42.0 and 28.0 ug/kg in April and July, respectively. These concentrations of DDE probably represent agricultural runoff throughout the area. However, it should be noted that no detectable concentrations of PCB-Aroclor 1254 were found in the hellgrammites from the tributaries. This absence would indicate a localized PCB contamination source on the Savannah River upstream of Station 8.

Crayfish--Crayfish (Cambarus bartonii and Procambarus raneyi) were collected in the Savannah River (Stations 2, 6, and 8), in Beaverdam Creek (Station 4), and in Little Generostee Creek (Station 7) during April through May and July through August. Crayfish collected in April in the Savannah River were not identified to species but were probably C. bartonii. This assumption is based on the greater abundance of this species in the Savannah River during the July through August collections. P. raneyi was virtually absent in the collections at Stations 6 and 8, but at Station 2, enough P. raneyi were found to enable between-species comparisons to be made at the same station.

Chemical analyses results for crayfish tissue are presented in Appendix G, Table G-2. Each sample consisted of a composite of at least five crayfish (usually 8 to 10). Comparisons of the chemical results for the two species of crayfish (C. bartonii and P. raneyi) collected at Station 2 in July indicate comparable heavy metal and pesticide concentrations, except for PCB-Aroclor 1254 which was 84 ug/kg wet weight in the P. raneyi sample but below the detection limit (25 ug/kg) in the C. bartonii sample. Although an attempt was made to use comparable numbers and sizes of crayfish at each station, some variation did occur. The P. raneyi sample at Station 2 in July consisted of nine crayfish (total wet weight 121 grams) and the C. bartonii sample consisted of 10 crayfish (total weight 69 grams). The higher total wet weight (121 grams) for P. raneyi crayfish indicates that the crayfish in this sample were slightly larger and possibly older, which could account for the higher PCB concentration in P. raneyi.

Chemical results for all crayfish collected in the Savannah River in April and in July through August show that concentrations of arsenic and selenium were always below the detection limits (0.5 and 0.5 mg/kg, respectively). Cadmium concentrations were substantially higher in the April samples than in the July through August samples (means of 2.50 and 0.11 mg/kg, respectively), but showed no consistent areal trends. Zinc concentrations were fairly uniform in the Savannah River with values varying between 25 and 54 mg/kg (mean 41 mg/kg). Concentrations for the remaining heavy metals were frequently above the detection levels but showed no consistent chronological or areal trends. Chromium concentrations ranged from <0.50 to 3.20 mg/kg, mercury from <0.006 to 0.120 mg/kg, and lead concentrations were always <6.80 mg/kg.

Detectable concentrations of organochlorine pesticides and PCBs were not found in any of the April crayfish samples from the Savannah River. In the July through August samples, however, detectable levels of chlordane, P'P' DDD, P'P' DDE, heptachlor, and PCB-Aroclor 1254 were found. Based on the limited number of organic analyses, chlordane concentrations were

<1.0 ug/kg at Station 8 and increased to a mean of 18.0 ug/kg for the two crayfish species (Cambarus bartonii and Procambarus raneyi) collected at Station 2. P'P' DDE concentrations ranged from 12.0 ug/kg in the crayfish from Station 8 to 20.0 ug/kg in the crayfish at Station 6. Eighteen ug/kg of P'P' DDD was also found in the crayfish from Station 6. Heptachlor concentrations ranged between 3.0 and 6.0 ug/kg. Concentrations of PCB-Aroclor 1254 varied from below the detection limit (<25 ug/kg) in the C. bartonii sample at Station 2 to 130 ug/kg at Station 10.

In Beaverdam Creek and Little Generostee Creek, concentrations of arsenic, cadmium, and selenium were generally near or below the detection limits (0.5, 0.05, and 0.5 mg/kg, respectively) in both the May and August samples. Chromium, lead, and mercury concentrations were often above the detection limits (0.5, 0.05, and 0.006 mg/kg, respectively). Chromium ranged from <0.50 to 1.70 mg/kg in crayfish from Station 4 and from 0.66 to 0.90 in crayfish from Station 7. Crayfish tissue concentrations of lead at Stations 4 and 7 ranged from 0.50 to 15.00 and 2.30 to 6.40 mg/kg, respectively, with higher concentrations found in the July samples. There were no consistent trends noted for mercury concentrations in the tributary crayfish and all values were <0.111 mg/kg. Based on the limited sampling, zinc concentrations in crayfish were substantially higher at Station 4 (mean 115.0 mg/kg) and Station 7 (mean 145.0 mg/kg) than at the Savannah River stations (mean 41.0 mg/kg). The reason for these elevated zinc concentrations in the crayfish from the tributaries is unknown. Organochlorine pesticides and PCB concentrations in crayfish from Stations 4 and 7 were all near or below the detection levels except for chlordane, P'P' DDE, and heptachlor. Chlordane concentrations in crayfish at Station 4 were 21.0 and 7.0 ug/kg and at Station 7 the levels were <1.0 and 4.0 ug/kg in May and August, respectively. P'P' DDE concentrations varied at Station 4 from 2.0 (May) to 6.0 ug/kg (August) and at Station 7 from 11.0 to 14.0 ug/kg in May and August, respectively. Heptachlor levels in

crayfish varied from 7.0 to 2.0 ug/kg at Station 4 and <1.0 to 1.0 ug/kg at Station 7 in May and August, respectively.

A comparison of the results for all the crayfish samples indicates that P'P' DDE is widespread throughout the study area since it was found in crayfish from both the Savannah River and the two tributary stations. Based on the relatively low concentrations found, agricultural runoff is probably the source of the DDE in the study area. The increase in organochlorine pesticides and PCBs in the Savannah River crayfish from July through August can probably be accounted for by the increase in activity and food consumption in the summer compared to that of the April through May sampling period. It should also be noted that while detectable levels of PCB-Aroclor 1254 were found in the crayfish collected in the Savannah River, no detectable levels of PCB were found in tributary crayfish. This is in agreement with insect larvae results and again indicates that PCBs in the study area are limited to the Savannah River.

Surface Fish--Complete chemical analyses results for surface fish collections are presented in Appendix G, Table G-3. Because of the habitat variability in the Savannah River, the same species of surface fish could not be collected at each of the tissue-sampling locations. Fish species collected were white bass (*Marone chrysops*) at Station 2, redbreast sunfish (*Lepomis auritus*) at Gregg Shoals, and bluegills (*Lepomis macrochirus*) at Station 10. Results of the heavy metal analyses indicate that, except for zinc, all heavy metal concentrations in surface fish collected from the Savannah River were near or below the detection levels. Zinc concentrations in white bass at Station 2 ranged from 3.3 to 23.0 mg/kg (mean 9.9 mg/kg). In the redbreast sunfish from Gregg Shoals, zinc concentrations ranged from 4.7 to 6.5 mg/kg (mean 5.8 mg/kg) and in the bluegills at Station 10, zinc ranged from 5.9 to 14.0 mg/kg (mean 8.4 mg/kg). No substantial or consistent trends in heavy metal concentrations were noted between sampling periods or between stations.

In white bass collected at Station 2, detectable levels of the following organochlorine pesticides and PCBs were found: BHC-alpha isomer--3.0 ug/kg (August); BHC-gamma isomer--2.0 ug/kg (August); chlordane--27.0 ug/kg (August); P'P' DDD--25 ug/kg (August); P'P' DDE--100 ug/kg (May) and 70 ug/kg (August); heptachlor--4 ug/kg (May) and 11 ug/kg (August); and PCB-Aroclor 1254--140 ug/kg (May) and 130 ug/kg (August). All other pesticides and PCB concentrations were below the detection levels. In redbreast sunfish collected at Gregg Shoals, detectable levels of pesticides and PCBs in the August collections were: BHC-alpha isomer--2.0 ug/kg; chlordane--6.0 ug/kg; P'P' DDD--8.0 ug/kg; P'P' DDE--70 ug/kg; P'P' DDT--11.0 ug/kg; heptachlor--3.0 ug/kg; and PCB-Aroclor 1254--52 ug/kg. In the May collections, the only detectable pesticide was P'P' DDE (12 ug/kg). In bluegills collected just downstream of Hartwell Dam (Station 10), P'P' DDE was the only pesticide which was substantially present (17.0 ug/kg) in May. In August, however, the following pesticides and PCBs were present: BHC-alpha isomer--3.0 ug/kg; chlordane--10.0 ug/kg; P'P' DDD--7.0 ug/kg; P'P' DDE--37.0 ug/kg; P'P' DDT--8.0 ug/kg; heptachlor--2.0 ug/kg; and PCB-Aroclor 1254--61 ug/kg. It is assumed that the elevated pesticide and PCB levels found in August reflect increases in fish activity and feeding compared to May levels.

At the tributary stations (Station 4 on Beaverdam Creek and Station 7 on Little Generostee Creek), heavy metal concentrations in the surface fish collected generally were near or below the detection limits although small quantities of mercury were detected in redbreast sunfish collected at Stations 4 and 7 with values ranging from 0.014 to 0.059 mg/kg. Zinc concentrations varied from 4.8 to 11.0 mg/kg (mean 5.9 mg/kg) and were comparable to the concentrations found in the surface fish in the Savannah River. However, these levels were substantially lower than the concentrations found in crayfish (mean of 73.0 mg/kg) or insect larvae (mean of 26 mg/kg) within the study area.

Bluegills and redbreast sunfish were both collected in July at Station 4 in order to compare variability between the two species. Based on these limited collections, it appears that bluegills collected at Station 4 had slightly higher levels of organochlorine pesticides and PCBs than did redbreasted sunfish. Detectable levels in bluegills were: BHC-alpha isomer--1.0 ug/kg; chlordane--12.0 ug/kg; P'P' DDD--6.0 ug/kg; P'P' DDE--27 ug/kg; heptachlor--2.0 ug/kg; and PCB-Aroclor 1254--38 ug/kg. In the redbreast sunfish at Station 4, the following parameters were detected: chlordane--9.0 ug/kg (July) and P'P' DDE--5.0 ug/kg (May and July). At Station 7 in Little Generostee Creek, detectable levels of pesticides and PCBs in redbreast sunfish collections were: chlordane--20 ug/kg (July); P'P' DDD--6.0 ug/kg (July); O'P' DDE--12 ug/kg (July); P'P' DDE--28 ug/kg (May) and 22.0 ug/kg (July); heptachlor--3.0 ug/kg (May) and 2.0 ug/kg (July); and PCB-Aroclor 1254--80 ug/kg (May). Since no detectable concentrations of PCB-Aroclor 1254 or the metabolites of DDT were found in insect larvae or crayfish at Stations 4 and 7, it is probable that the bluegills and redbreast sunfish have migrated into the tributaries from the Savannah River, possibly overwintering in the river.

Bottom Fish--In the Spring, silver redhorse suckers (*Moxostoma anisurum*) migrate from the deeper waters where they overwinter up into shallow waters to spawn. During the April through May sampling period, silver redhorse suckers were present at all five tissue sampling stations (Stations 2, 4, 6, 7, and 8). In August, silver redhorse suckers were still present in the Savannah River but were very scarce in the tributaries; due to this scarcity, green bullheads (*Ictalurus brunneus*) were collected in Beaverdam Creek (Station 4) and in Little Generostee Creek (Station 7) in August. Complete chemical results for these bottom-feeding fish are presented in Appendix G, Table G-4.

Table G-4 shows that, with the exception of mercury and zinc, heavy metal concentrations in both fish species were near or below the detection levels in all samples. Mercury concentrations in the silver redhorse

suckers at Station 2 also were generally near the detection level (ranging from <0.006 to 0.039 mg/kg), but mercury concentrations at Stations 6 and 8 were slightly elevated. At Station 6, mercury concentrations in the fish ranged from 0.031 to 0.330 mg/kg (mean 0.198 mg/kg) and at Station 8 the concentrations ranged from <0.006 to 0.250 mg/kg (mean 0.157 mg/kg). At Station 4, mercury levels varied from <0.006 to 0.330 (mean 0.169 mg/kg) and at Station 7 the levels ranged from <0.006 to 0.250 (mean 0.157 mg/kg). Due to the limited number of analyses, it is not certain if the elevated mercury levels represent actual increased concentrations or if they are simply normal variability in analyses. Zinc concentrations for all bottom-fish samples were fairly uniform with values ranging between 1.4 and 9.9 mg/kg (mean 4.1 mg/kg). These concentrations are comparable to the levels found in the surface fish.

Comparison of the results for the Savannah River bottom-fish samples indicate that the concentrations of the detectable organochlorine pesticides and PCBs become progressively greater upstream. In the April through May sampling period, the concentration of PCB-Aroclor 1254 was 570, 1,400, and 1,600 ug/kg in fish from Stations 2, 6, and 8, respectively; in August, the levels were 110, 480, and 1,200 ug/kg at Stations 2, 6, and 8, respectively. Based on this limited sampling, it appears that the silver redhorse suckers at the upstream stations in the Savannah River are more highly contaminated with PCB than fish at the downstream stations. At the tributary sampling locations in April, the concentration of PCB-Aroclor 1254 in the silver redhorse suckers was 2,400 ug/kg at Station 4 and 260 ug/kg at Station 7. As stated previously, the silver redhorse suckers move into shallow water in spring to spawn. Since silver redhorse suckers were not found in the tributaries in August, it is probable that the populations in Beaverdam Creek and Little Generostee Creek were transitory and actually spent most of the year in the river. Therefore, the chemical concentrations found in the silver redhorse suckers at Station 4 and 7 are probably not indicative of any levels of contamination in the tributaries.

Concentrations of DDT and its metabolites in the silver redhorse suckers followed the same trends as the PCB concentrations. In May, concentrations of P'P' DDD and P'P' DDE were 74.0 and 480.0 ug/kg, respectively, in fish from Station 2. Concentrations at Stations 6 and 8 were masked by the high concentrations of PCB present. However, in July, concentrations of P'P' DDD were 16.0, 48.0, and 170.0 ug/kg; P'P' DDE concentrations were 75.0, 320.0, and 910.0 ug/kg; and P'P' DDT concentrations were 21.0, 140.0, and 400 ug/kg at Stations 2, 6, and 8, respectively.

BHC-alpha isomer, chlordane, and heptachlor concentrations also progressively increased upstream in the August fish samples from the Savannah River. BHC levels were 2.0, 6.0, and 22.0 ug/kg; chlordane levels were 13.0, 52.0, and 150.0 ug/kg; and heptachlor levels were 3.0, 8.0, and 23.0 ug/kg at Stations 2, 6, and 8, respectively. The reason for this trend is not certain but may indicate a source of contamination for these parameters upstream of Station 8--possibly in Hartwell Lake.

Detectable concentrations of pesticides and PCBs in the August green bullhead samples from Beaverdam Creek were: chlordane--7.0 ug/kg; P'P' DDD--4.0 ug/kg; and P'P' DDE--5.0 ug/kg. In the August green bullhead samples from Little Generostee Creek, detectable concentrations were: chlordane--5.0 ug/kg; P'P' DDD--6.0 ug/kg; O'P' DDE--5.0 ug/kg; and P'P' DDE--41.0 ug/kg. Concentrations of all other parameters (including PCBs) were below the detection levels. This again indicates that PCB contamination is currently restricted to the Savannah River.

SUMMARY

SUMMARY

The purpose of the Richard B. Russell Preimpoundment Study was to document the preimpoundment water quality conditions within the future area of Lake Russell. The database will be utilized for the combined purposes of future reference, identification of any potential water quality problems prior to reservoir filling in 1983, and facilitation of coordination between the COE Savannah District and state agencies in the implementation of watershed pollution control measures.

Meteorological, hydrological, water quality, sediment, and biological data were obtained at a total of 12 sampling locations in a 48-km (30-mile) stretch of the Savannah River and its tributaries just downstream of Hartwell Dam. Sampling was performed during two major sampling periods (February and July) in 1981. Biological sampling included bacteria, periphyton, macroinvertebrates, insect larvae, crayfish, fish, and riparian vegetation.

Flow within the reach of the Savannah River study area is presently governed by water discharge from Hartwell Dam during periods of peak power generation. These discharges generally occur on weekday mornings and afternoons for periods of 4 to 5 hours and create rapid changes in flow, depth, temperature, dissolved oxygen, and other physical-chemical properties of the tailwater.

Water quality sampling was performed at each of the designated stations on February 9, 11, and 13 and July 13, 15, and 17. Sampling during February was representative of cold temperatures and high flow conditions (primarily caused by a storm event with 7.1 cm of rainfall). Sampling during July was representative of warm temperatures and low flow (non-storm event) conditions. In addition, a diel study was conducted at four sampling stations (Stations 2, 3, 4, and 10) on July 16 and 17 with sampling at 3-hour intervals for 24 hours.

Water Quality

In general, the water quality of the Savannah River and its tributaries within the study area is of good quality. No lateral or vertical stratification was found for temperature, dissolved oxygen, or pH at any of the sampling locations. In February, the water temperature was $\leq 8°C$ at all stations. By July, the temperatures had warmed to approximately 24°C except in the Savannah River where temperatures were approximately 10°C lower. Specific conductance generally was low in both the February and July sampling periods (overall mean of 55 umhos/cm at 25°C). In February, dissolved oxygen levels were near (>90 percent) or above the saturation level. In July, dissolved oxygen levels and percent saturation values were lower, but were still >5 mg/l (55-percent saturation) at all stations. pH values generally ranged between 5.0 and 7.6, while ORPs ranged from +407 mv in Coldwater Creek (Station 5) in February to +669 mv just downstream of Hartwell Dam (Station 10) in February. These ORP levels are characteristic of highly oxygenated waters throughout the southeastern United States.

On February 9 in the Savannah River and its tributaries at Stations 1 through 10 (Figure 1), color, turbidity, and total nonfilterable residue levels generally were low (overall means of 32 Pt-Co units, 5.9 FTU, and <6 mg/l, respectively). Comparable levels were found in July.

The water of the Savannah River and its tributaries can be classified as soft, with values for alkalinity and hardness generally <50 and 25 mg $CaCO_3$/l, respectively. Chloride levels were relatively low and uniform, with most values generally between 1 and 8 mg Cl/l. Iron and manganese concentrations generally were within the range expected in slightly acidic surface waters where clay is the predominant soil type. Iron and manganese concentrations usually were <1.0 mg/l except on February 11. Potassium concentrations generally were <3 mg K/l and sodium concentrations were <5 mg Na/l. TOC values were approximately 2.2 mg C/l prior to the heavy (7.1-cm) rainfall on February 10 and 11, but generally were higher in July (mean 5.3 mg C/l). Free CO_2

concentrations generally were lower in July (mean of 15 mg CO_2/l) than in February (mean of 39 mg CO_2/l) at Stations 1 through 10.

Total ammonia, nitrate plus nitrite, TKN, and dissolved TKN levels generally were slightly higher in the tributaries than in the Savannah River. During July, total phosphate levels were higher in the tributaries than in the Savannah River (means of 0.165 and 0.036 mg P/l, respectively); levels were comparable to those on February 9.

On February 9, BOD and COD levels were relatively low (means of 1.5 and 7.2 mg/l, respectively) in the lower portion of the Savannah River and its tributaries; comparable levels were found in July. Chlorophyll levels were relatively uniform in February with a mean concentration of <5 ug/l. In July, chlorophyll concentrations were higher in the tributaries (mean 3.15 ug/l) than in the Savannah River. The highest chlorophyll levels were found in Station 4 (Beaverdam Creek) (mean 7.08 ug/l) in July.

Total coliform (TC), fecal coliform (FC), and fecal streptococcus (FS) concentrations generally were low at all stations on February 9 and July 13, 15, and 17. FC to FS (FC:FS) ratios indicate nonhuman bacterial sources for all samples collected during both February and July, except at Station 7 (Little Generostee Creek) on February 9 when the FC:FS ratio was approximately 14.

The most significant event during the water quality sampling was a 7.1-cm rainfall on February 10 and 11. On February 9, sampling performed at each station probably reflect normal February levels for the parameters sampled. Sampling on February 11 resulted in levels indicative of a very heavy rainfall with associated excessive watershed runoff. Conditions were returning to near normal on February 13. On February 11 following the 7.1-cm rainfall, color, turbidity, and total nonfilterable residue

levels in the Savannah River and its tributaries increased one to two orders of magnitude with means of 125 Pt-Co units, 188 FTU, and 291 mg/l, respectively.

Total iron concentrations also increased in the lower portion of the Savannah River and in Rocky River (Station 3), Beaverdam Creek (Station 4), Coldwater Creek (Station 5), and Little Generostee Creek (Station 7), with mean concentrations >15 mg Fe/l. TOC values also increased in the lower portion of the Savannah River and its tributaries (mean of 5.7 mg C/l). Total ammonia, nitrate plus nitrite, TKN, and dissolved TKN levels only slightly increased, whereas total phosphate, orthophosphate, and dissolved orthophosphate levels increased by approximately one order of magnitude (mean of 0.583, 0.044, and 0.045 mg P/l, respectively) compared to the levels on February 9. BOD levels increased slightly (mean of 3.8 mg/l), but COD levels increased substantially (mean 37 mg/l).

Of all the parameters, bacteria showed the greatest changes in concentrations. In the lower portion of the Savannah River (Stations 1 and 2), FC, TC, and FS concentrations increased from geometric mean levels of <4, 770, and 4/100 ml on February 9 to mean levels of 510, 4,867, and 7,141/100 ml on February 11. In the tributaries, geometric mean concentrations of FC, TC, and FS increased from 97, 155, and 76/100 ml on February 9 to mean concentrations of 1,210, >5,837, and 21,226/100 ml on February 11. These large increases were due to the excessive watershed runoff; FC:FS ratios indicate nonhuman bacterial sources for all samples.

Comparison of Results With Water Quality Criteria

A comparison of the water quality results to the EPA, Georgia, and South Carolina water quality criteria shows that the detected levels for the abovementioned parameters generally were within acceptable levels, except for those due to natural causes such as the low alkalinity values and the high iron and bacteria concentrations following the 7.1-cm rainfall on February 10 and 11.

Diel Water Quality

Results of the July diel sampling did not produce much useful information since three of the stations (Stations 2, 3, and 10) were located downstream of dams which discharged water for power generation during the period of the diel. Instead of showing the gradual declines and increases expected during a diel, the results reflected changes which occur when water is discharged from the dams upstream for power generation. During the diel, there was a drop in water temperature and dissolved oxygen (with corresponding percent saturation of dissolved oxygen) as the wave front of the discharged water passed the sampling locations; these values then slowly increased again. Limited variation was found in the other chemical parameters and values were comparable to those measured during the water quality sampling.

Station 4 (Beaverdam Creek) was the only one of the four diel stations where typical diel trends were found during the sampling. Temperature, dissolved oxygen, percent saturation of dissolved oxygen, and pH increased during the day and decreased at night, while the reverse trends were found for CO_2. Limited variation was found in the other chemical parameters and levels were comparable to those found during the water quality sampling.

Sediments

Sediment sampling results for the February and July periods show that the bottom sediments generally are coarse sand in the portions of the Savannah River and its tributaries which are not characterized by exposed bedrock. Means for TOC, volatile solids, and oil and grease were 0.11, 1.0, and 0.2 percent total dry weight, respectively, with little variation found between stations. TKN (range <20 to 260, mean 69 mg N/kg dry weight) and total phosphorus (range 27 to 410, mean 83 mg P/kg dry weight) levels in the sediments were slightly higher in the tributaries than in the Savannah River.

Mean concentrations (mg/kg dry weight) of metals had the following ranges: arsenic, cadmium, and copper--<1.0; chromium, lead, nickel, and zinc--<10; mercury--<0.014; manganese--<350; and iron--<5,400. These ranges are not indicative of serious levels of heavy metal contamination in areas where clay is the predominant soil type. Pesticide and PCB concentrations were below the detection levels in all of the sediment samples from both February and July.

Periphyton

Diatoms accounted for the greatest percentage of all algal divisions present on the Periphytometers™ in February and July (83 and 52 percent, respectively). Cool water temperatures probably account for this distribution, since diatoms prefer water temperatures of <30°C. Cell densities in the Savannah River were lowest just below Hartwell Dam (2,148 and 73,659 cells/cm^2 in February and July, respectively) and gradually increased downstream to Station 1 just below Richard B. Russell Dam site (175,065 and 1,043,963 cells/cm^2 in February and July, respectively). Variation in water velocity passing the Periphytometers™ probably accounts for this cell density gradient. Cell densities in the tributaries were apparently more dependent on temperature and light intensity. Most of the diatom species found during this study were characteristic of circumneutral-to-acidic water of low mineral content. Nineteen of the 73 diatom taxa found during this study are associated with eutrophication in lakes throughout the eastern and southeastern United States (Taylor et al., 1980). These taxa generally were found in low cell densities and also may be found frequently in moderately enriched waters. Total phosphate levels indicate that Rocky River (Station 3), Coldwater Creek (Station 5), and Little Generostee Creek (Station 7) could be classified as unenriched to moderately enriched, while the remainder of the tributaries and the Savannah River would be classified as highly enriched waters, based on the limited sampling during this study.

Macroinvertebrates

Benthic and Hester-Dendy macroinvertebrate assemblages were characteristic of pollution-free riverine environments. Diversity and biomass values generally were lower in the Savannah River than in the tributaries.

Following completion of Richard B. Russell Dam and filling the reservoir, the drastically reduced flow rates will probably result in a "rain" of fine silt which will eventually collect at the bottom of the reservoir. The slow-moving water and silt-laden bottom will result in a shift from the present macroinvertebrate assemblages to ones dominated by the burrowing mayfly (Hexagenia), the Asiatic clam (Corbicula), Chaoborus, chironomids, and oligochaetes.

Station 11 Water Quality

Of the water quality stations sampled, Station 11 was the most significant in regard to potential water quality problems when the reservoir is filled. This sampling station, located in a small stream (<2 meters wide) which presently receives the discharge from the Bigelow-Sanford Carpet Factory, was sampled on February 13 and July 15. In February, the water was a definite purple color; in July, it was green due to the presence of dye in the water. Color levels were 300 to 400 Pt-Co units in both February and July, and the dye concentration was high enough to dye the ropes used to attach the Periphytometers™ and Hester-Dendy samplers. Of the parameters sampled, the following were substantially higher at Station 11 than at the other stations within the study area: conductivity (mean 207 umhos/cm at 25°C), color (mean 370 Pt-Co units), sodium (mean 27.68 mg Na/l), TOC (mean 24.2 mg C/l), BOD (mean 13 mg/l), COD (mean 66.5 mg/l), TKN (mean 3.14 mg N/l), and dissolved TKN (mean 1.83 mg N/l).

Additional water quality sampling was performed upstream of Station 11 (at Station 12) in July. Replicate means for the abovementioned

parameters were considerably lower with the following mean concentrations: conductivity (151 umhos/cm at 25°C), color (105 Pt-Co units), sodium (8.02 mg Na/l), TOC (3.3 mg C/l), BOD (<1 mg/l), COD (2.7 mg/l), TKN (<0.25 mg N/l), and dissolved TKN (<0.25 N/l).

Sediment sampling results at Station 11 indicate higher mean concentrations of volatile solids (3.35 percent total dry weight), TKN (145 mg N/kg), total phosphorus (244 mg P/kg), copper (4.7 mg Cu/kg), iron (17,800 mg Fe/kg), and zinc (27.9 mg Zn/kg) compared to the other stations. Since sediment sampling was not performed upstream of the Bigelow-Sanford Carpet Factory discharge, it is not known if these elevated levels are related to the carpet factory discharge or are characteristic of this stream due to the higher percentages of silt and clay in the sediments.

Periphyton concentrations were low at Station 11 compared to the other tributaries (1,351 cells/cm^2 in February) with diatoms accounting for 87 percent of the assemblage present on the Periphytometer™ in February. In July, concentrations were higher (27,817 cells/cm^2) and Chlorophyta accounted for the highest percentage (50 percent) of the assemblage. However, it was noted that very few euperiphytic species were present but planktonic species were abundant. The reason for the lack of periphytic species at this station is unknown.

The benthic macroinvertebrate community at Station 11 was one adapted to heavy siltation, low dissolved oxygen, and a high rate of organic loading. Tubificids, saprophilic midge larvae (Psectrotanypus dyari), and other facultative midges were the dominant macroinvertebrates present.

Tissues

Results of the tissue analyses indicate that concentrations of metals generally were near or below the detection levels with no substantially

higher values found. However, detectable levels of BHC, chlordane, and heptachlor, as well as generally high levels of PCB-Aroclor 1254 and metabolites of DDT, were found in tissue samples collected in the Savannah River. Concentrations of P'P' DDE in the caddisfly larvae, crayfish, surface feeding fish, and bottom feeding fish generally ranged from 10 to 46, 12 to 20, 12 to 100, and 75 to 910 ug/kg wet weight, respectively, in the Savannah River. Detectable levels of PCB-Aroclor 1254 in the same tissue samples ranged from 61 to 170, 83 to 130, 52 to 130, and 110 to 1,600 ug/kg wet weight, respectively.

In the two tributaries sampled [Beaverdam Creek (Station 4) and Little Generostee Creek (Station 7)], detectable levels of BHC, chlordane, and heptachlor were occasionally found in the hellgrammites, crayfish, and surface fish, but levels were not as high as in the Savannah River. Detectable P'P' DDE levels ranged from 6 to 42, 2 to 14, and 5 to 28 ug/kg wet weight, respectively, in the hellgrammites, crayfish, and surface feeding fish. However, detectable concentrations of PCB-Aroclor 1254 were not found in these tissues. This data indicates that the low concentrations of BHC, chlordane, heptachlor, and metabolites of DDT detected in the tributaries are due to agricultural runoff throughout the system. PCB-Aroclor 1254 appears to be limited to the Savannah River, with the primary source of contamination upstream of Hartwell Dam since detectable levels (61 ug/kg wet weight) were found in bluegills caught just below Hartwell Dam in July and concentrations in silver redhorse suckers increased progressively upstream from Station 2 to Station 8 in both the April-through-May and the August sampling periods.

Since pesticide and PCB concentrations in sediment samples from the Savannah River and its tributaries were all below the detection levels and could not be the contaminating source, it is unknown where or how the organisms within the study area are contacting the pesticides and PCBs. Obviously, the organisms cannot migrate upstream of Hartwell Dam and then return downstream. However, since no pesticide or PCB analyses were performed on the water samples, or on the abundant algae and aquatic

mosses which grow profusely on the rocks in the river and streambeds, it is possible that either or both of these sources may be responsible for the significant concentrations of chemicals within the organisms' tissues.

RECOMMENDATIONS

RECOMMENDATIONS

Areas of Concern

Analysis of the results of this preimpoundment study indicate two major areas which deserve consideration for future study. These areas of concern are described in the following sections.

Bigelow-Sanford Carpet Factory Discharges--Analysis of data from Station 11 (downstream of the Bigelow-Sanford Carpet Factory discharge) identified a significant increase in numerous water quality and sediment parameters during both the February and July 1981 sampling periods. It appears that these elevated levels are related to the Bigelow-Sanford Carpet Factory discharge since levels of these parameters were substantially lower upstream of the discharge in July. Upon completion of the Richard B. Russell Dam and the filling of the reservoir, the Bigelow-Sanford Carpet Factory discharge will be carried in a pipeline from the factory to the vicinity of Station 11 and discharged into the Rocky River arm of the reservoir through a diffusion head at the end of the pipeline. Since the end of this pipeline will be at an elevation of 122 meters (400 feet), and the maximum power pool will be at 144.8 meters (475 feet), the factory discharge will probably discharge into the hypolimnion of Lake Russell. However, the water discharged will probably rise to the surface due to the warmer temperature of the discharge versus the lake water. Therefore, it is recommended that further investigations be conducted to determine exactly what components are being discharged from the Bigelow-Sanford Carpet Factory in order to assess the effects the discharge will have in the reservoir of Richard B. Russell Dam.

Significant Elevated Levels of PCB-Aroclor 1254 and Metabolites of DDT in the Savannah River--Analysis of the results of this study also indicate high levels of PCB-Aroclor 1254 and metabolites of DDT (particularly P'P' DDE) in the Savannah River, with the probable source upstream of the study area. Unusually high concentrations of these chlorinated hydrocarbons were found in silver redhorse suckers having concentrations that

progressively increased upstream in the Savannah River. Pesticide and PCB concentrations in the sediment samples from the Savannah River were all below the detection level (see Table 3). Due to the high concentrations of pesticides and PCBs in organisms and low concentrations in sediment samples, it is therefore recommended that further investigation be performed to determine the sources from which the organisms in the Savannah River are contacting the pesticides and PCBs. This investigation should include a determination of the pesticide and PCB concentrations in the water and abundant algae and aquatic mosses which grow profusely on the rocks. Since water from the reservoir will be affecting a much larger area, this determination will be critical to evaluate the potential extent of future contamination upon filling the reservoir.

Postimpoundment Study Recommendation

It is recommended that a postimpoundment study be performed to include possible periodic monitoring during filling of the reservoir in order to evaluate water quality changes which will chronologically develop in Lake Russell.

Postimpoundment water quality studies should not be performed until equilibrium has been reached.

PARTICIPATING STAFF

PARTICIPATING STAFF

Personnel primarily responsible for the sampling, data analyses, and report preparation during the Richard B. Russell Preimpoundment Study are listed in the following chart with respect to their individual area of specialization, experience, and role in the study.

PARTICIPATING STAFF
FOR THE
RICHARD B. RUSSELL PREIMPOUNDMENT STUDY

PRIMARY PERSONNEL

Name	Area of Specialization	Experience	Role in Study
Dr. H.D. Putnam	Aquatic Biologist, Ecologist	10 years, Faculty, University of Florida, Department of Environmental Sciences; 6 years, Aquatic Biology and Ecology, Environmental Science and Engineering, Inc.; 1974-Present, Aquatic Biology and Ecology, Environmental Assessment, Water and Air Research, Inc.	Project Manager.
Mr. M.K. Hein	Aquatic Botanist, Ecologist/Diatom and Algal Systematics	5 years experience in environmental consulting with particular expertise in aquatic systems, water quality, and botany.	Logistics, field supervision, water quality, diel, and tissue sampling, periphyton identification, data analysis, and report preparation.
Mr. W.G. Thiess	Environmental Engineer/ Water Resources	2 years experience in environmental consulting with emphasis on water quality studies.	Logistics, field supervision, water quality and diel sampling, data analysis, and report preparation.
Mr. D.L. Evans	Aquatic Biologist, Ecologist/Benthic Macroinvertebrate Systematics	3 years experience in environmental consulting with emphasis on aquatic systems and toxicological studies.	Benthic macroinvertebrate sampling and identification, sediment sampling, data analysis, and report preparation.
Mr. B.C. Pruitt, Jr.	Environmental Science/ Terrestrial Ecology, Aquatic Macroinvertebrates	11 years in environmental science; 6 years participating in interdisciplinary environmental studies with consulting firms.	Benthic macroinvertebrate and sediment sampling, vegetation mapping, macroinvertebrate identification, and report preparation.
Mr. C.R. Fellows	Environmental Scientist/ Environmental Chemistry	5 years in environmental laboratory supervision; participation in water quality nutrient budget research projects.	Supervision of all in-house inorganic analyses on water, sediments, and tissues.
Mr. R.D. Baker	Analytical Organic Chemistry/Gas Chromatograph (GC) and High Performance Liquid Chromatography (HPLC) Analyses	5 years experience in GC and HPLC analyses of pesticides, PCB's, EPA priority pollutants, and miscellaneous organics.	Organic analyses on sediments and tissues.
Mr. J.C. Nichols	Environmental Engineer/ Hydrology, Water Quality, Computer Sciences	1 year, Design Engineer, Bessent, Hammock, and Ruckman, Inc.; 2 years, Design Engineer, City of Tampa, Florida; 6 years, Environmental Engineer, Environmental Studies, Water and Air Research, Inc.	Supervision and coordination of all computerized data handling.

TECHNICAL SUPPORT PERSONNEL

Area of Specialization/Role in Study	Name
Field Work	Mr. D.P. Chamberlin, Mr. M.P. Dickinson, Mr. R.H. Lewis, Ms. A.M. Pechiney, Mr. M.P. Timpe
Laboratory Analyses	Mr. G.S. Burch, Ms. M.T. DeEchegaray, Ms. N.C. Hodge, Mr. S.W. Jett, Mr. M.J. Malloy, Ms. A.M. Pechiney, Mr. R.K. Rowe, Ms. D.L. Scott, Mr. M.P. Timpe, Mr. J.E. Thomas
Macroinvertebrate Picking and Sorting	Ms. K.A. Barnes, Mr. D.P. Chamberlin, Mr. T.P. DesJean, Ms. C.H. Evans
Computerized Data Handling	Ms. K.A. Barnes
Document Production, Coordination, and Technical Writing/Editing	Ms. N.E. Lehman
Graphics and Drafting	Ms. P.A. Klaus, Mr. J.R. Hollowell, Ms. D.D. Nickelson
Word Processing	Ms. J.S. Dorsey, Ms. C.M. Waite, Ms. C.K. Carter, Ms. A.L. Finnicum

REFERENCES

REFERENCES

American Public Health Association, American Water Works Association, and Water Pollution Control Federation. 1980. Standard methods for the examination of water and wastewater, 15th ed. American Public Health Association, Washington, D.C. 1,134 pp.

Baker, A.S. and A.J. McLachlan. 1979. Food preferences of Tanypodinae larvae (Diptera:Chironomidae). Hydrobiologia 62(3):283-288.

Beck, E.C. 1962. Five new chironomidae (Diptera) from Florida. Florida Entomologist 45(2):89-92.

Beck, E.C. and W.M. Beck, Jr. 1969a. The chironomidae of Florida. II. The nuisance spacies. Florida Entomologist 52(1):1-11.

Beck, E.C. and W.M. Beck, Jr. 1969b. Chironomidae (Diptera) of Florida III. The Harnischia complex (Chironominae). Bulletin of the Florida State Museum, Biological Sciences, Vol. 13(5):277-313.

Beck, W.M., Jr. 1954. Studies in stream pollution biology: I. A simplified ecological classification of organisms. Journal of the Florida Academy of Sciences 17(4):211-227.

Beck, W.M., Jr. 1977. Environmental requirements and pollution tolerance of common freshwater chironomidae. U.S. Environmental Protection Agency, Cincinnati, Ohio. EPA 600/4-77-024. 261 pp.

Beck, W.M., Jr. 1976. Biology of the larval chironomids. Florida State Department of Environmental Regulation, Tallahassee, Florida. 58 pp.

Beck W.M., Jr. and E.C. Beck. 1970. The immature stages of some Chironomini (Chironomidae). Quarterly Journal of the Florida Academy of Sciences 33(1):29-42.

Bourrelly, P. 1966-1970. Les algues d'eau douce. Tome 1, 511 pp. Tome 2, 438 p. Tome 3, 512 pp. N. Boubee & Cie, Paris, France.

Brinkhurst, R.O. 1966. Detection and assessment of water pollution using oligochaete worms. Water and Sewage Works 113:398-401.

Brinkhurst, R.O. and B.G.M. Jamieson. 1971. Aquatic oligochaeta of the world. University of Toronto Press, Toronto, Canada. 860 pp.

Brown, Harley P. 1972. Biota of freshwater ecosystems, identification manual no. 6, aquatic dryopoid beetles (Coleoptera) of the United States. U.S. Government Printing Office, Washington, DC. 82 pp.

Cairns, J. 1956. Effects of increased temperature on aquatic organisms. Journal of Industrial Waters 1:150-152.

Cleve-Euler, A. 1951-1955. Die Diatomeen von Schweden und Finnland, Kungliga Svenska Vetenskaps-Akajemiens Handlingar, Fjarde Serien, Band 2, Stockholm. Teil I, 2(1), 1951, 163 pp.; Teil V, 3(3), 1952, 153 pp.; Teil II, 4(1), 1953a, 158 pp.; Teil III, 4(5), 1953b, 255 pp.; Teil IV, 5(4), 1955, 232 pp.

Curry, L.L. 1958. Larvae and pupae of the species of Cryptochironomus (Diptera) in Michigan. Limnology and Oceanography 3:427-442.

Durfor, C.M. and E. Becker. 1964. Public water supplies of the 100 largest cities in the U.S., 1962. U.S. Geological Survey Water Supply Paper 1812. U.S. Government Printing Office, Washington, D.C. 364 pp.

Edmunds, G.F., Jr., S.L. Jensen and L. Berner. 1976. The mayflies of the North and Central America. University of Minnesota Press, Minneapolis. 330 pp.

Hem, J.D. 1959. Study and interpretation of the chemical characteristics of natural water. U.S. Geological Survey Water Supply Paper 1473, U.S. Government Printing Office, Washington, D.C. 269 pp.

Heurck, H. van. 1896. A treatise on the Diatomaceae. William Wesley and Son, London. 558 pp.

Hilsenhoff, W.L. 1975. Aquatic insects of Wisconsin. With generic keys and notes on biology, ecology, and distribution. Wisconsin Department of National Resources, Tech. Bull. No. 89. 52 pp.

Hiltunen, J.K. and D.J. Klemm. 1980. A guide to the Naididae (Annelida: Clitellata: Oligochaeta) of North America. Environmental Monitoring and Support Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio. 48pp.

Holsinger, J.R. 1972. Biota of freshwater ecosystems--identification manual no. 5, freshwater amphipod crustaceans (Gammaridae) of North America. U.S. Government Printing Office, Washington, DC. 80 pp.

Huber-Pestalozzi, G. 1938. Das Phytoplankton des Susswassers, Teil 1, Blaualgen, Bakterien, Pilze. In: A. Thienemann, editor. Die Binnengewasser. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. 342 pp.

Huber-Pestalozzi, G. 1941. Das Phytoplankton des Susswassers, Teil 2, Halfte 1, Chrysophycean, Farblose Flagellaten, Heterokonten. In: A. Thienemann, editor. Die Binnengewasser. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. 365 pp.

Huber-Pestalozzi, G. 1950. Das Phytoplankton des Susswassers, Teil 3, Cryptophyceen, Chloromonadinen, Peridineen. In: A. Thienemann, editor. Die Binnengewasser. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. 310 pp.

Huber-Pestalozzi, G. 1955. Das Phytoplankton des Susswassers, Teil 4, Euglenophyceen. In: A. Thienemann, editor. Die Binnengewasser. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. 1,135 pp.

Huber-Pestalozzi, G. 1961. Das Phytoplankton des Susswassers, Teil 5, Chlorophyceae. In: A. Thienemann, editor. Die Binnengewasser. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. 744 pp.

Huber-Pestalozzi, G. and F. Hustedt. 1942. Das Phytoplankton des Susswassers, Teil 2, Halfte 2. Diatomeen. In: A. Thienemann, editor. Die Binnengewasser. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. 182 pp.

Hustedt, F. 1927-1930. Die Kieselalgen Deutschlands, Osterreichs und der Schweis unter Berucksichtigung der ubrigen Lander Europas sowie der angrenzenden Meeresgebiete. Band 7, Teil 1. In: L. Rabenhorst, editor. Kryptogamen-Flora von Deutschland, Osterreich und der Schweiz. Akademische Verlagsgesellschaft Geest und Portig K.-G., Leipzig, Deutschland. 920 pp.

Hustedt, F. 1930. Bacillariophyta (Diatomeae). In: A. Pascher, editor. Die Susswasser-Flora Mitteleuropas. Heft 10. Gustav Fischer Verlag, Jena. 466 pp.

Hustedt, F. 1931-1959. Die Kieselalgen Deutschlands, Osterreichs und der Schweis unter Berucksichtigung der ubrigen Lander Europas sowie der angrenzenden Meeresgebiete. Band 7, Teil 2. In: L. Rabenhorst, editor. Kryptogamen-Flora von Deutschland, Osterreich und der Schweiz. Adademische Verlagsgesellschaft Geest und Portig K.-G., Leipzig, Deutschland. 845 pp.

Hustedt, F. 1949. Susswasser-Diatomeen aus dem Albert-Nationalpark in Belgisch-Kongo. In: Institute des Parcs Nationaux du Congo Belge. Exploration du Parc National Albert: Mission H. Damas (1935-1936). Fascicule 8. Marcel Hayez, Bruxelles. 199 pp.

Hustedt, F. 1961-1966. Die Kieselalgen Deutschlands, Osterreichs und der Schweis unter Berucksichtigung der ubrigen Lander Europas sowie der angrenzenden Meeresgebiete. Band 7, Teil 3. In: L. Rabenhorst, editor. Kryptogamen-Flora von Deutschland, Osterreich und der Schweiz. Akademische Verlagsgesellschaft Geest und Portig K.-G., Leipzig, Deutschland. 816 pp.

Isom, B.G. 1971. Effects of storage and mainstream reservoirs on benthic macroinvertebrates in the Tennessee Valley. In: Hall, G.E., editor. Reservoirs and fisheries limnology. American Fisheries Society Special Publication No. 8, pp. 179-191.

Kendall, D.R. 1981. Personal Communication. U.S. Army Corps of Engineers, Savannah District, Savannah, Georgia.

Koppen, J.D. 1975. A morphological and taxonomic consideration of Tabellaria (Bacillariophycea) from the northcentral United States. Journal of Phycology 11(2):236-244.

Lowe, R.L. 1974. Environmental requirements and pollution tolerance of freshwater diatoms. U.S. Environmental Protection Agency, Cincinnati, Ohio. EPA-670/4-74-005. 334 pp.

Mason, W.T., Jr. 1973. An introduction to the identification of chironomid larvae. U.S. Environmental Protection Agency, Natural Environmental Research Center, Analytical Quality Control Laboratory, Cincinnati, Ohio. 90 pp.

Matter, W.J., G.E. Saul, and J.M. Nestler. 1980. Scour and transportation of benthic invertebrates and particulate organic material during peak power release regimes. Environmental and Water Quality Operational Studies. Vol. E-80-5, October 1980. U.S. Army Engineers Waterways Experiment Station, Vicksburg, Mississippi. 6 pp.

McIntyre, A.D. 1969. Ecology of marine meiobenthos. Biological Review 44:245-290.

Odum, E.P. 1971. Fundamentals of ecology. W.B. Saunders Company, Philadelphia, Pennsylvania. 574 pp.

Parrish, Fred K. (ed.). 1968. Keys to water quality indicative organisms (Southeastern United States). Federal Water Pollution Control Administration, U.S. Environmental Protection Agency. 195 pp.

Patrick, R. and C.W. Reimer. 1966. The diatoms of the United States. Vol. 1. Academy of Natural Sciences of Philadelphia Monograph No. 13. 688 pp.

Patrick, R. and C.W. Reimer. 1975. The diatoms of the United States. Vol. 2. Part 1. Academy of Natural Sciences of Philadelphia Monograph No. 13. 213 pp.

Pennak, R.W. 1978. Freshwater invertebrates of the United States. John Wiley and Sons, Inc., New York. 803 pp.

Prescott, G.W. 1962. Algae of the western Great Lakes area. Wm. C. Brown Company, Dubuque, Iowa. 977 pp.

Roback, S.S. 1963. The genus Xenochironomus (Diptera: Tendipedidae) Kieffer, taxonomy and immature stages. Transactions of the American Entomological Society 88:235-245.

Roback, S.S. 1969. The immature stages of the genus Tanypus Meigen (Diptera: Chironomidae: Tanypodinae). Transactions of the American Entomological Society 94:407-428.

Saether, O.A. 1977. Taxonomic studies on chironomidae: Nanocladius, Pseudochironomus, and the Harnischia complex. Department of Fisheries and Environment, Fisheries and Marine Service. Bull. No. 196. 143 pp.

Schmidt, A., et al. 1874-1959. Atlas der Diatomaceen-Kunde. R. Reisland, Leipzig. Heft 1-120, Tafeln 1-480. (Tafeln 1-212, A. Schmidt, 1874-1897; Tafeln 213-216, M. Schmidt, 1899; Tafeln 217-232, Fr. Fricke, 1899-1902; Tafeln 233-240, M. Schmidt and Fr. Fricke, 1902; Tafeln 241-244, H. Heiden, 1903; Tafeln 245-246, O. Muller, 1904; Tafeln 247-248, M. Schmidt and Fr. Fricke, 1904; Tafeln 249-256, Fr. Fricke, 1904-1905; Tafeln 257-264, H. Heiden, 1905-1906; Tafel 265, Fr. Fricke, 1906; Tafel 266, M. Schmidt and Fr. Fricke, 1906; Tafeln 267-268, Fr. Fricke, 1906; Tafeln 269-274, Fr. Hustedt, 1911; Tafeln 275-277, Fr. Fricke and Fr. Hustedt, 1911-1912; Tafeln 278-283, Fr. Hustedt, 1912; Tafel 284, Fr. Fricke and Fr. Hustedt, 1912; Tafeln 285-290, Fr. Hustedt, 1913; Tafel 291, Fr. Fricke and Fr. Hustedt, 1913; Tafeln 292-420, Fr. Hustedt, 1913-1958; Tafeln 421-432 not issued; Tafeln 433-480, Fr. Hustedt, 1940-1959).

Schoeman, F.R. and R.E.M. Archibald. 1976-1980. The diatom flora of Southern Africa. National Institute for Water Research, Council for Scientific and Industrial Research, Pretoria, South Africa. Parts 1-6. 399 pp.

Simpson, K.W. and R.W. Bode. 1980. Common larvae of chironomidae (Diptera) from New York state streams and rivers with particular reference to the fauna of artificial substrates. New York State Museum Bulletin No. 439. 105 pp.

Sinclair, R.M. 1964. Water quality requirements of the family Elmidae (Coleoptera). Tennessee Stream Pollution Control Board, Tennessee Department of Public Health, Nashville, Tennessee. 14 pp.

Smith, G.N. 1950. The fresh-water algae of the United States. McGraw-Hill Book Company, New York, New York. 719 pp.

Taylor, W.D., L.R. Williams, S.C. Hern, V.W. Lambou, T.A. Morris, M.K. Morris, and C.L. Howard. 1980. Phytoplankton water-quality relationships in U.S. lakes, Part VIII: Algae associated with or responsible for water-quality problems. Environmental Monitoring Systems Lab., Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada. 317 pp.

Thompson, F.G. 1968. The aquatic snails of the family Hydrobiidae of peninsular Florida. University of Florida Press, Gainesville, Florida. 268 pp.

Tsui, P.T.P. and B.W. Breedlove. 1978. Use of the multiplate sampler in biological monitoring on the aquatic environment. Florida Scientist 41(2):110-116.

U.S. Army Corps of Engineers. 1974. Savannah District. Land Acquisition for Richard B. Russell Dam and Lake. Public information booklet. Savannah, Georgia. 21 pp.

U.S. Army Corps of Engineers. Savannah District. 1976. Richard B. Russell Dam and Lake Project. Public Information Pamphlet. 3 pp.

U.S. Environmental Protection Agency. 1976. Quality criteria for water. Washington, D.C. 256 pp.

U.S. Environmental Protection Agency. 1979. Handbook for analytical quality control in water and wastewater laboratories. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

Usinger, R.L. 1956. Aquatic insects of California. University of California Press, Berkley, California. 508 pp.

Utermöhl, H. 1931. Neue wege in der quantitativen erfassung des planktons. International Vereinigung für Theoretische und Angewandte Limnologie, Verhandlungen 5:567-596.

Utermöhl, H. 1958. Zur vervollkommnung der quantitativen phytoplankton-methodik. International Vereinigung für Theoretische und Angewandte Limnologie, Mitteilung 9:1-38.

VanLandingham, S.L. 1967-1979. Catalogue of the fossil and recent genera and species of diatoms and their synonyms. Parts 1-8. J. Cramer, Vaduz, Germany. 4,654 pp.

Weitzel, R.L. 1979. Periphyten measurements and applications. In Weitzel, R.L., editor. Methods and measurements of periphytic communities: a review. ASTM STP 690, American Society for Testing and Materials, Baltimore, Maryland. pp. 3-33.

Werff, A. van der. 1953. A new method of concentrating and cleaning diatoms and other organisms. International Association of Theoretical and Applied Limnology, Verhandlugen, Vol. 12:276-277.

Werner, D. 1977. The biology of diatoms. Botanical monographs, Vol. 13, University of California Press, Berkeley, California. 498 pp.

Whitford, L.A. and G.J. Schumacher. 1973. A manual of the fresh-water algae. Sparks Press, Raleigh, North Carolina. 324 pp.

Wiggins, G.B. 1977. Larvae of the North American caddisfly genera (Trichoptera). University of Toronto Press, Toronto, Canada. 401 pp.

Wilhm, J.L. 1970. Range of diversity index in benthic macroinvertebrate populations. Journal of the Water Pollution Control Federation 42(5):R221-R224.

APPENDICES

APPENDIX A

STREAM FLOW DATA

LIST OF APPENDIX A TABLES

Table A-1. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
1981 Monthly Average Discharges (CFS) on the Savannah River at State Highway 184 Bridge

Month	USGS Station No. 02187500 Iva, Highway 184 Bridge (CFS)
January	3,067
February	2,643
March	2,207
April	2,363
May	2,650
June	2,143
July	2,454

Source: USGS, Water Resources Division, Columbia, South Carolina (Preliminary Data).

Table A-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Daily Mean Gage Heights and Discharges on the Savannah River

Date		USGS Station No. 02189000 Calhoun Falls, Highway 72 Bridge	USGS Station No. 02187500 Iva, Highway 184 Bridge	
		Mean Gage Height (Feet) Above Datum	Mean Gage Height (Feet) Above Datum	Mean Discharge (CFS)
February				
1	Sunday	2.29	1.99	1,580
2	Monday	2.26	2.59	3,260
3	Tuesday	3.91	3.78	6,160
4	Wednesday	4.87	4.36	8,320
5	Thursday	3.41	3.06	3,690
6	Friday	2.88	2.90	3,120
7	Saturday	1.95	1.67	919
8	Sunday	1.19	1.01	242
9	Monday	2.34	2.33	2,570
10	Tuesday	2.81	2.88	3,050
11	Wednesday	4.30	3.28	3,900
12	Thursday	4.30	3.99	6,780
13	Friday	4.06	3.43	4,710
14	Saturday	2.15	1.88	1,130
15	Sunday	1.52	1.23	393
Gage Datum		363.53 ft	432.26 ft	
July				
5	Sunday	0.43	2.68	3,740
6	Monday	1.02	—	—
7	Tuesday	—	—	—
8	Wednesday	3.12	2.81	3,550
9	Thursday	3.28	2.85	4,210
10	Friday	2.44	2.10	1,610
11	Saturday	1.92	0.97	226
12	Sunday	0.66	1.03	465
13	Monday	2.07	3.83	7,470
14	Tuesday	3.21	2.99	4,430
15	Wednesday	3.00	3.14	4,840
16	Thursday	2.88	2.35	2,120
17	Friday	1.81	1.72	971
18	Saturday	2.02	0.93	197
19	Sunday	0.72	2.14	3,410
Gage Datum		363.53 ft	432.26 ft	

Source: USGS, Water Resources Division, Columbia, South Carolina (Preliminary Data).

Table A-3. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Monthly Average Discharge Rates* for Hartwell Dam, Savannah River

Date	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1974	8,400	8,900	4,500	5,000	4,500	3,700	4,500	4,700	4,100	1,800	3,100	3,400
1975	2,800	4,900	8,200	8,200	6,100	3,700	3,400	3,900	3,300	6,200	7,100	6,000
1976	4,500	4,400	5,300	6,600	5,700	8,900	11,300	3,800	3,300	2,400	5,100	5,500
1977	5,400	2,300	3,400	10,500	3,500	3,400	3,400	4,300	3,500	2,900	5,300	6,300
1978	6,400	6,200	3,900	2,800	5,700	4,100	3,300	3,300	3,400	2,400	3,200	3,200
1979	2,900	3,400	8,000	10,300	7,000	8,400	4,200	4,800	3,900	4,900	7,300	4,800
1980	5,900	4,900	6,300	12,100	6,100	5,600	4,000	4,000	3,500	2,900	2,700	3,700
1981	2,900	2,300	1,900	2,000	2,400	2,400	2,800	4,200	2,700	2,700		

* Mean monthly discharges in cubic feet per second for the average day of the month.

Source: U.S. Army Corps of Engineers, Hartwell Dam and Power Plant Operators, Personal Communication.

Table A-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Daily Rainfall Amounts for Elberton, Georgia*

February	1981	Precipitation (centimeters)	July	1981	Precipitation (centimeters)
1	Sunday	0	5	Sunday	0
2	Monday	1.19	6	Monday	0.08
3	Tuesday	0	7	Tuesday	0.53
4	Wednesday	0	8	Wednesday	0
5	Thursday	0	9	Thursday	0
6	Friday	0	10	Friday	0
7	Saturday	0	11	Saturday	0
8	Sunday	0	12	Sunday	0
9	Monday	0	13	Monday	0
10	Tuesday	0	14	Tuesday	0
11	Wednesday	7.11	15	Wednesday	0
12	Thursday	0.08	16	Thursday	0
13	Friday	0	17	Friday	2.29
14	Saturday	0	18	Saturday	0
15	Sunday	0	19	Sunday	5.18

* As recorded daily at 7:00 a.m. at the City of Elberton Water Treatment Plant.

Source: City of Elberton Water Treatment Plant, Elberton, Georgia, (Unpublished Data).

APPENDIX B

FIELD DATA

LIST OF APPENDIX B TABLES

Table B-1. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Field Data—Sampled February 9, 1981

Parameter	Station 1	2	3	4	5	6	7	8	9	10
Time:	1315	1130	1500	0945	1241	1158	1139	1050	1033	0951
Meteorological										
Air Temperature (°C)	9.0	7.0	14.0	6.0	4.0	–	–	5.0	3.0	4.0
Cloud Cover (percent)	20	0	Haze	0	0	0	0	0	0	0
Hydrological										
Total Depth (meters)	4	1.5	2	0.5	0.4	2.8	0.4	2	0.4	2
Relative Depth Due to Dam Discharge	Low	Low	High	Normal				High		High
X-Section Location (percent from right bank looking upstream)	20	40	10	50	25	50	30	50	50	100
Wave Height (meters)	0	0	0	<0.1	0	0	0	0	0	0
Current Speed (fps)	0	2.5	3	3	1.5	1.5	1	2–3	0.5	2–3
Secchi Disc Transparency (meters)	1.5			>T.D.						
Depth of 1-Percent Surface Light (meters)	2.8	>T.D.	10	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.
In Situ Parameters										
Water Temperature (°C)	5.0	3.0	3.0	4.0	3.8	6.2	2.8	6.0	2.5	6.0
Specific Conductance Field (umhos/cm 25°C)	42	46	55	50	38	32	43	30	58	30
Dissolved Oxygen, Electrode (mg/1)	12.0	12.4	12.6	13.5	13.8	12.8	15.0	14.3	14.1	12.6
Dissolved Oxygen, (percent saturation)	94	92	93	103	105	103	111	115	103	101
pH (standard units)	6.4	5.8	5.6	5.6	5.9	6.2	5.1	5.5	5.5	5.3
Oxidation Reduction Potential (mv)	619	617	602	530	586	548	497	528	552	623

NOTE: >T.D. = Greater than total depth of water.

Source: WAR, 1981.

Table B-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Field Data—Sampled February 11, 1981

Parameter	Station 1	2	3	4	5	6	7	8	9	10
Time:	1100	1030	1130	0900	1230	1153	1140	1030	1009	0940
Meteorological										
Air Temperature (°C)	13.0	16.0	17.0	15.0	7.0	10.0	16.0	19.0	15.0	11.0
Cloud Cover (percent)	95	60	98	75	100	100	100	75	50	95
Hydrological										
Total Depth (meters)	2	2	2–3	2	1.7	2	2	2	2	1.5
Relative Depth Due to Dam Discharge*	Normal	High	High	High	High	High	High	High	High	High
X-Section Location (percent from right bank looking upstream)	20	2	5	5	50	50	60	50	75	100
Wave Height (meters)	0	0.1	0	0.2	0	0	0	0	0.1	0
Current Speed (fps)	1–2	3–4	3.5	6	2–3	1	1–2	2–3	3	1.5
Secchi Disc Transparency (meters)					0.05	0.05	0.05	>T.D.	0.05	>T.D.
Depth of 1-Percent Surface Light (meters)	0.5	<0.5	0.2	0.1						
In Situ Parameters										
Water Temperature (°C)	8.0	8.0	8.0	7.5	6.5	7.5	6.5	6.8	6.0	6.0
Specific Conductance Field (umhos/cm 25°C)	40	40	40	40	34	34	40	29	39	28
Dissolved Oxygen, Electrode (mg/1)	12.0	11.4	11.8	12.4	12.2	11.9	12.4	12.4	11.2	12.8
Dissolved Oxygen, (percent saturation)	101	96	99	103	99	99	101	101	90	103
pH (standard units)	6.7	5.8	5.9	5.5	5.5	6.0	6.1	5.7	6.0	6.1
Oxidation Reduction Potential (mv)	601	621	546	591	407	496	437	452	588	523

NOTE: >T.D. = Greater than total depth of water.

* Water levels were high at most stations due to 7.1 cm of rain in the area on February 10 and 11, 1981.

Source: WAR, 1981.

Table B-3. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Field Data—Sampled February 13, 1981

Parameter		Station 1	2	3	4	5	6	7	8	9	10	11
	Time:	1145	1200	1100	1230	0900	0935	1000	1035	1057	1120	0930
Meteorological												
Air Temperature (°C)		4.5	5.0	6.0	8.0	−3.0	−2.0	−1.0	2.0	1.0	2.0	2.0
Cloud Cover (percent)		5	5	0	5	0	0	0	0	0	0	
Hydrological												
Total Depth (meters)		1.5	1	1	1	0.6	2	0.5	2	1.0	1.0	0.5
Relative Depth Due to Dam Discharge*		High	High	High	High		High	Normal	High		Normal	Normal
X-Section Location (percent from right bank looking upstream)		20	5	10	10	50	50	50	50	70	95	50
Wave Height (meters)		0	0	0	0	0	0	0	0	0	0	0
Current Speed (fps)		1	3-4	3-4	4	1.7	3-4	1.5	3	0.9	2-3	1
Secchi Disc Transparency (meters)						0.3	1.5	>T.D.	>T.D.	0.5	>T.D.	
Depth of 1-Percent Surface Light (meters)		>T.D.	1.0	>T.D.	0.5							0.3
In Situ Parameters												
Water Temperature (°C)		5.0	4.0	4.0	3.0	0.9	4.0	1.2	4.5	2.0	5.5	1.0
Specific Conductance field (umhos/cm 25°C)		35	43	43	58	30	31	41	30	44	31	148
Dissolved Oxygen, Electrode (mg/l)		12.9	12.9	13.4	13.2	13.8	12.6	13.8	12.3	12.9	12.2	>15.0
Dissolved Oxygen, (percent saturation)		101	98	102	98	97	96	98	95	93	97	>105
pH (standard units)		5.6	6.0	5.8	6.0	5.3	5.7	4.3	5.8	4.4	3.5	6.1
Oxidation Reduction Potential (mv)		494	478	465	592	429	475	494	505	538	669	459

NOTE: >T.D. = Greater than total depth of water.

* Water levels still high at some stations due to 7.1 cm of rain in the area on February 10 and 11, 1981.

Source: WAR, 1981.

Table B-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Field Data—Sampled July 13, 1981

Parameter	Station 1	2	3	4	5	6	7	8	9	10
Time:	0930	1215	1100	0800	1056	1008	0954	0909	0823	0848
Meteorological										
Air Temperature (°C)	31.0	36.0	35.0	25.0	34.0	35.0	31.0	30.0	27.0	24.0
Cloud Cover (percent)	0	0	0	Fog	0	0	0	0	0	0
Hydrological										
Total Depth (meters)	4.5	1	0.7	0.5	0.2	3.2	0.3	0.6	0.5	1.0
Relative Depth Due to Dam Discharge	Normal	Normal	Normal			Normal		Normal		
X-Section Location (percent from right bank looking upstream)	10	5	50	50	60	60	50	50	50	50
Wave Height (meters)	0	0	0	0.1	0	0	0	0	0	0
Current Speed (fps)	0	1	2	2	1	<0.1	0.5	0.2	0.5	0
Secchi Disc Transparency (meters)	0.2	0.5	>T.D.	0.3	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.
Depth of 1-Percent Surface Light (meters)	1.7	>T.D.	>T.D.							
In Situ Parameters										
Water Temperature (°C)	24.0	27.0	23.0	25.0	25.0	22.0	23.0	21.5	23.0	15.5
Specific Conductance Field (umhos/cm 25°C)	76	53	68	85	40	32	57	56	66	38
Dissolved Oxygen, Electrode (mg/1)	7.4	7.5	7.6	6.7	7.9	5.4	5.5	7.0	5.2	6.5
Dissolved Oxygen, (percent saturation)	87	93	88	80	94	61	63	79	60	65
pH (standard units)	7.4	7.4	7.6	6.9	5.5	6.2	6.9	7.6	6.8	6.7
Oxidation Reduction Potential (mv)	596	588	587	585	585	584	587	594	597	607

NOTE: >T.D. = Greater than total depth of water.

Source: WAR, 1981.

Table B-5. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Field Data—Sampled July 15, 1981

Parameter		Station 1	2	3	4	5	6	7	8	9	10	11	12
	Time:	0915	0845	1000	0800	1126	1047	1028	0945	0852	0924	1030	1030
Meteorological													
Air Temperature (°C)		30.0	29.0	31.0	26.0	30.0	34.0	31.0	32.0	30.0	28.5	31.0	31.0
Cloud Cover (percent)		0	0	0	Haze	0	0	0	0	0	0	0	0
Hydrological													
Total Depth (meters)		1	1	1	0.3	0.2	3	0.5	1.0	0.3	1.0	0.2	0.3
Relative Depth Due to Dam Discharge		High	High	Normal			Normal		Normal		Normal		
X-Section Location (percent from right bank looking upstream)		5	5	50	50	50	60	50	50	50	99	60	50
Wave Height (meters)		0	0.1	0	0.1	0	0	0	0	0	0	0	0
Current Speed (fps)		1	1	1	2	1	<0.1	0.5	<0.1	0.5	0	1	1
Secchi Disc Transparency (meters)		>T.D.	1.1	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	0.3
In Situ Parameters													
Water Temperature (°C)		14.0	17.0	22.5	26.0	26.0	15.0	25.0	15.5	24.0	14.0	25.0	23.0
Specific Conductance Field (umhos/cm 25°C)		37	46	68	88	49	42	59	46	69	39	265	151
Dissolved Oxygen, Electrode (mg/1)		10.2	9.1	7.0	7.0	7.1	7.2	7.7	8.0	5.8	7.0	7.1	8.1
Dissolved Oxygen, (percent saturation)		98	93	80	85	86	71	92	80	68	68	85	93
pH (standard units)		6.1	6.0	6.4	6.4	6.6	6.6	6.9	6.4	6.6	6.3	6.8	7.4
Oxidation Reduction Potential (mv)		543	505	518	504	589	617	615	641	596	583	415	412

NOTE: >T.D. = Greater than total depth of water.

Source: WAR, 1981.

Table B-6. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Field Data—Sampled July 17, 1981

Parameter	Station 1	2	3	4	5	6	7	8	9	10
Time:	0840	0730	0715	0750	1040	0933	0913	0828	0804	0740
Meteorological										
Air Temperature (°C)	29.0	27.0	27.0	27.5	31.0	31.0	31.0	31.5	29.5	26.0
Cloud Cover (percent)	0	10	20	5	0	0	0	0	0	Fog
Hydrological										
Total Depth (meters)	1.0	1.5	1.5	0.5	0.3	3	0.3	1.0	0.3	1.0
Relative Depth Due to Dam Discharge	Normal	Normal	Normal	Normal						Normal
X-Section Location (percent from right bank looking upstream)	10	5	50	50	60	60	50	50	50	95
Wave Height (meters)	0	0.1	0	0.1	0	0	0	0	0	0
Current Speed (fps)	<0.5	2	2	2	0.5	<0.1	0.2	0.2	0.5	0
Secchi Disc Transparency (meters)	>T.D.	>T.D.	1.4	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.	>T.D.
In Situ Parameters										
Water Temperature (°C)	19.0	19.0	21.5	25.5	26.0	14.0	24.5	15.0	24.0	13.0
Specific Conductance Field (umhos/cm 25°C)	39	50	75	109	49	43	60	55	72	40
Dissolved Oxygen, Electrode (mg/l)	9.0	9.0	7.2	6.9	5.7	6.1	5.4	6.0	5.7	8.5
Dissolved Oxygen, (percent saturation)	96	96	81	83	69	59	64	59	67	80
pH (standard units)	5.8	6.1	6.1	6.4	6.8	6.7	6.7	6.7	6.4	5.9
Oxidation Reduction Potential (mv)	442	512	499	444	484	483	461	487	446	575

NOTE: >T.D. = Greater than total depth of water.

Source: WAR, 1981.

Table B-7. Richard B. Russell Preimpoundment Study--Contract No. DACW21-81-C-0029
Diel Field Data--Savannah River, Georgia and South Carolina--Sampled July 16 and 17, 1981

Parameter		Diel: Station 2							
	Time:	1045	1325	1630	1940	2230	0135	0415	0730
Hydrological									
Total Depth (meters)		0.5	0.5	1.0	1.0	1.0	1.5	1.5	1.5
Relative Depth Due to Dam Discharge		Normal	Normal	Normal	Low	Low	High	High	Normal
X-Section Location (percent from right bank looking upstream)		5	5	5	5	5	5	5	5
In Situ Parameters									
Water Temperature (°C)		17.0	19.0	21.0	21.0	20.5	21.0	19.5	19.0
Specific Conductance Field (umhos/cm 25°C)		46	45	43	43	44	43	44	50
Dissolved Oxygen, Electrode (mg/1)		9.4	9.8	9.6	9.5	9.2	8.8	9.1	9.0
Dissolved Oxygen, (percent saturation)		97	105	107	106	101	98	98	96
pH (standard units)		6.4	6.2	6.0	5.8	6.2	6.0	6.1	6.1

Source: WAR, 1981.

Table B-8. Richard B. Russell Preimpoundment Study--Contract No. DACW21-81-C-0029
Diel Field Data--Rocky River, South Carolina--Sampled July 16 and 17, 1981

Parameter				Diel: Station 3				
	Time: 1100	1315	1645	1915	2250	0015	0450	0715
Hydrological								
Total Depth (meters)	0.5	0.5	1.5	1.5	1.5	1.5	1.0	1.5
Relative Depth Due to Dam Discharge	Normal	Normal	High	High	High	High	High	Normal
X-Section Location (percent from right bank looking upstream)	50	50	50	50	50	50	50	50
In Situ Parameters								
Water Temperature (°C)	24.0	26.0	24.0	24.5	22.5	23.0	21.0	21.5
Specific Conductance Field (umhos/cm 25°C)	71	69	71	71	74	73	76	75
Dissolved Oxygen, Electrode (mg/1)	6.8	7.0	6.4	6.4	6.3	6.4	7.2	7.2
Dissolved Oxygen, (percent saturation)	80	85	75	76	72	74	80	81
pH (standard units)	6.7	6.5	6.2	6.1	6.0	6.1	6.2	6.1

Source: WAR, 1981.

Table B-9. Richard B. Russell Preimpoundment Study--Contract No. DACW21-81-C-0029
Diel Field Data--Beaverdam Creek, Georgia--Sampled July 16 and 17, 1981

Parameter	Time:	Diel: Station 4							
		1010	1350	1615	1940	2215	0155	0415	0750
Hydrological									
Total Depth (meters)		0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Relative Depth Due to Dam Discharge		Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
X-Section Location (percent from right bank looking upstream)		50	50	50	50	50	50	50	50
In Situ Parameters									
Water Temperature (°C)		27.0	29.5	30.5	29.0	28.5	27.0	26.0	25.5
Specific Conductance Field (umhos/cm 25°C)		96	100	93	97	102	110	113	109
Dissolved Oxygen, Electrode (mg/l)		7.5	8.6	8.6	7.4	6.8	6.6	6.0	6.9
Dissolved Oxygen, (percent saturation)		93	112	114	95	87	82	73	83
pH (standard units)		7.0	7.5	7.7	7.2	6.8	6.6	6.6	6.4

Source: WAR, 1981.

Table B-10. Richard B. Russell Preimpoundment Study--Contract No. DACW21-81-C-0029
Diel Field Data--Savannah River, Georgia and South Carolina--Sampled July 16 and 17, 1981

	Diel: Station 10							
Parameter Time:	1030	1330	1630	1930	2230	0130	0430	0740
Hydrological								
Total Depth (meters)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Relative Depth Due to Dam Discharge	Low	Low	High	Low	Low	Low	Low	Low
X-Section Location, (percent from right bank looking upstream)	95	95	99	95	95	95	95	95
In Situ Parameters								
Water Temperature (°C)	16.0	16.5	12.0	12.0	12.5	13.0	13.0	13.0
Specific Conductance Fluid (umhos/cm 25°C)	38	46	39	40	40	40	37	40
Dissolved Oxygen, Electrode (mg/l)	8.0	8.8	6.0	8.4	8.4	8.2	8.0	8.5
Dissolved Oxygen, (percent saturation)	80	89	55	78	78	77	75	80
pH (standard units)	6.4	6.2	6.1	5.6	5.7	5.8	5.8	5.9

NOTE: Water released from Hartwell Dam from 1410 to 1813 for power generation.

Source: WAR, 1981.

APPENDIX C

WATER QUALITY AND BACTERIOLOGY DATA

LIST OF APPENDIX C TABLES

Table C-1

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/9/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 2/ 9/81	STATION 1-B 2/ 9/81	STATION 2-A 2/ 9/81	STATION 2-B 2/ 9/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	24.	26.	22.	23.
TURBIDITY, HACH TURBIDIMETER (FTU)	8.00	7.00	5.00	5.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	6.	5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	28.	29.	31.	26.
CHLORIDE (MG CL/L)	2.8	3.0	3.1	3.2
CALCIUM, TOTAL (MG CA/L)	2.4	2.9	2.8	3.1
HARDNESS, TOTAL (MG CACO3/L)	12.	12.	12.	13.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.38	0.40	0.25	0.31
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.06	< 0.05	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.30	1.50	1.60	1.60
SODIUM, TOTAL (MG NA/L)	4.10	4.10	4.40	4.30
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	2.0	2.0	2.0	2.5
FREE CARBON DIOXIDE (MG CO2/L)	26.	21.	30.	38.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.021	0.034	0.019	0.021
NITROGEN, NITRATE+NITRITE (MG N/L)	0.240	0.240	0.280	0.270
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.006	0.004	0.008	0.007
PHOSPHATE, ORTHO (MG P/L)	0.003	0.003	0.004	0.003
PHOSPHATE, TOTAL (MG P/L)	0.021	0.022	0.025	0.023
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	2.	--	2.	--
COD (MG/L)	2.5	--	10.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	< 1	2	16	9
TOTAL COLIFORM (/100ML)	420	700	1100	1100
FECAL STREPTOCOCCI (/100ML)	2	2	9	11
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	4.80	4.20	6.60	6.60

Table C-1 (Continued, Page 2 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/9/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 3-A 2/ 9/81	STATION 3-B 2/ 9/81	STATION 4-A 2/ 9/81	STATION 4-B 2/ 9/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	20.	25.	65.	70.
TURBIDITY, HACH TURBIDIMETER (FTU)	7.00	8.00	10.00	9.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	11.	11.	< 5.	6.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	33.	29.	28.	31.
CHLORIDE (MG CL/L)	3.8	3.6	5.1	4.8
CALCIUM, TOTAL (MG CA/L)	3.1	3.1	3.1	2.8
HARDNESS, TOTAL (MG CACO3/L)	16.	15.	18.	11.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	0.23
IRON, TOTAL (MG FE/L)	0.36	0.23	0.60	0.76
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.07	0.06	< 0.05	0.06
POTASSIUM, TOTAL (MG K/L)	1.90	1.90	2.00	1.90
SODIUM, TOTAL (MG NA/L)	4.90	4.90	5.80	5.80
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	3.0	3.0	2.5	2.5
FREE CARBON DIOXIDE (MG CO2/L)	60.	42.	41.	55.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.028	0.032	0.029	0.022
NITROGEN, NITRATE+NITRITE (MG N/L)	0.300	0.310	0.450	0.430
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.30	0.31	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.009	0.008	0.021	0.019
PHOSPHATE, ORTHO (MG P/L)	0.004	0.004	0.018	0.022
PHOSPHATE, TOTAL (MG P/L)	0.033	0.032	0.050	0.052
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	2.	--	2.	--
COD (MG/L)	5.6	--	21.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	130	80	120	140
TOTAL COLIFORM (/100ML)	14	20	560	570
FECAL STREPTOCOCCI (/100ML)	56	59	100	65
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	13.00	13.00	6.00	6.10

Table C-1 (Continued, Page 3 of 5)

RICHARD B. RUSSELL PRE IMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/9/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 5-A 2/ 9/81	STATION 5-B 2/ 9/81	STATION 6-A 2/ 9/81	STATION 6-B 2/ 9/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	50.	50.	7.	9.
TURBIDITY, HACH TURBIDIMETER (FTU)	9.00	6.00	2.00	2.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	18.	17.	13.	13.
CHLORIDE (MG CL/L)	1.9	1.9	1.7	1.2
CALCIUM, TOTAL (MG CA/L)	1.6	1.6	1.7	1.7
HARDNESS, TOTAL (MG CACO3/L)	10.	12.	7.	9.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.60	0.50	0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.07	< 0.05	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.40	1.60	0.77	0.92
SODIUM, TOTAL (MG NA/L)	2.90	2.60	2.20	2.30
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	1.5	1.0	2.0	1.5
FREE CARBON DIOXIDE (MG CO2/L)	66.	99.	75.	61.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.034	0.033	0.021	0.022
NITROGEN, NITRATE+NITRITE (MG N/L)	0.320	0.320	0.140	0.140
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.007	0.004	0.004	0.002
PHOSPHATE, ORTHO (MG P/L)	0.005	0.004	0.005	<0.002
PHOSPHATE, TOTAL (MG P/L)	0.015	0.017	0.008	0.010
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	1.	--	1.	--
COD (MG/L)	4.0	--	4.6	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	16	20	1	4
TOTAL COLIFORM (/100ML)	71	77	62	72
FECAL STREPTOCOCCI (/100ML)	47	47	2	3
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	0.87	0.99	2.00	1.60

Table C-1 (Continued, Page 4 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/9/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 2/ 9/81	STATION 7-B 2/ 9/81	STATION 8-A 2/ 9/81	STATION 8-B 2/ 9/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	39.	45.	10.	9.
TURBIDITY, HACH TURBIDIMETER (FTU)	5.00	6.00	4.00	2.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	25.	27.	17.	15.
CHLORIDE (MG CL/L)	2.3	2.4	1.2	1.3
CALCIUM, TOTAL (MG CA/L)	2.5	2.4	1.3	1.6
HARDNESS, TOTAL (MG CACO3/L)	--*	14.	--*	9.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	< 0.20	0.46	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	< 0.05	0.07	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.10	1.80	1.30	1.10
SODIUM, TOTAL (MG NA/L)	3.80	4.00	2.40	2.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	2.5	2.5	2.0	1.0
FREE CARBON DIOXIDE (MG CO2/L)	46.	39.	25.	25.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.024	0.029	0.026	0.022
NITROGEN, NITRATE+NITRITE (MG N/L)	0.360	0.440	0.140	0.130
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.014	0.014	0.004	0.007
PHOSPHATE, ORTHO (MG P/L)	0.012	0.010	0.002	<0.002
PHOSPHATE, TOTAL (MG P/L)	0.033	0.032	0.010	0.011
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	1.	--	1.	--
COD (MG/L)	4.4	--	2.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	270	270	< 1	< 1
TOTAL COLIFORM (/100ML)	320	370	< 1	2
FECAL STREPTOCOCCI (/100ML)	20	17	< 1	2
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	3.00	3.20	1.90	1.60

*Insufficient sample volume.

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/9/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 2/ 9/81	STATION 9-B 2/ 9/81	STATION 10-A 2/ 9/81	STATION 10-B 2/ 9/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	55.	60.	8.	10.
TURBIDITY, HACH TURBIDIMETER (FTU)	10.00	7.00	2.00	3.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	6.	6.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	19.	23.	15.	17.
CHLORIDE (MG CL/L)	3.3	3.2	1.2	1.2
CALCIUM, TOTAL (MG CA/L)	1.8	1.7	1.6	2.4
HARDNESS, TOTAL (MG CACO3/L)	15.	9.	8.	8.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.00	0.66	< 0.20	0.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	< 0.05	0.09	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.90	1.60	1.40	1.10
SODIUM, TOTAL (MG NA/L)	5.00	5.30	2.40	2.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	2.0	1.5	1.0	1.0
FREE CARBON DIOXIDE (MG CO2/L)	70.	65.	34.	62.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.220	0.210	0.022	0.021
NITROGEN, NITRATE+NITRITE (MG N/L)	0.450	0.400	0.140	0.130
NITROGEN, DISSOLVED TKN (MG N/L)	0.40	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	0.26	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.042	0.043	0.002	0.002
PHOSPHATE, ORTHO (MG P/L)	0.033	0.033	<0.002	<0.002
PHOSPHATE, TOTAL (MG P/L)	0.120	0.130	0.007	0.007
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	2.	--	1.	--
COD (MG/L)	3.0	--	5.1	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	120	140	< 1	1
TOTAL COLIFORM (/100ML)	390	350	1	< 1
FECAL STREPTOCOCCI (/100ML)	650	460	8	6
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	2.30	1.90	1.30	1.50

Table C-2

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/11/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 2/11/81	STATION 1-B 2/11/81	STATION 2-A 2/11/81	STATION 2-B 2/11/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	160.	130.	150.	150.
TURBIDITY, HACH TURBIDIMETER (FTU)	130.00	140.00	340.00	280.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	120.	120.	360.	350.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	18.	19.	26.	22.
CHLORIDE (MG CL/L)	2.2	1.8	1.8	2.4
CALCIUM, TOTAL (MG CA/L)	2.8	2.9	3.7	3.6
HARDNESS, TOTAL (MG CACO3/L)	16.	16.	24.	21.
IRON, DISSOLVED (MG FE/L)	0.91	1.10	1.10	1.30
IRON, TOTAL (MG FE/L)	6.00	6.70	15.00	17.00
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.17	0.15	0.49	0.52
POTASSIUM, TOTAL (MG K/L)	1.80	1.70	3.10	3.10
SODIUM, TOTAL (MG NA/L)	3.00	2.90	3.50	3.30
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	6.0	5.0	6.0	6.0
FREE CARBON DIOXIDE (MG CO2/L)	67.	66.	47.	40.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.077	0.079	0.038	0.055
NITROGEN, NITRATE+NITRITE (MG N/L)	0.210	0.190	0.180	0.170
NITROGEN, DISSOLVED TKN (MG N/L)	0.36	0.42	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.45	0.33	< 0.25	0.31
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.042	0.050	0.062	0.032
PHOSPHATE, ORTHO (MG P/L)	0.046	0.039	0.055	0.046
PHOSPHATE, TOTAL (MG P/L)	0.260	0.290	0.520	0.470
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	3.	--	4.	--
COD (MG/L)	17.0	--	23.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	620	520	430	490
TOTAL COLIFORM (/100ML)	4700	4100	5200	5600
FECAL STREPTOCOCCI (/100ML)	10000	7600	5500	6100
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	--*	--*	--*	--*

*Excessive silt and clay in sample.

Table C-2 (Continued, Page 2 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/11/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 3-A 2/11/81	STATION 3-B 2/11/81	STATION 4-A 2/11/81	STATION 4-B 2/11/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	160.	170.	160.	180.
TURBIDITY, HACH TURBIDIMETER (FTU)	210.00	220.00	360.00	390.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	410.	430.	600.	610.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	19.	19.	23.	13.
CHLORIDE (MG CL/L)	2.6	2.6	2.2	2.2
CALCIUM, TOTAL (MG CA/L)	3.1	3.0	3.5	3.5
HARDNESS, TOTAL (MG CACO3/L)	20.	18.	18.	29.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	1.40	1.50
IRON, TOTAL (MG FE/L)	17.00	18.00	23.00	25.00
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	0.12	0.09
MANGANESE, TOTAL (MG MN/L)	0.64	0.67	0.56	0.58
POTASSIUM, TOTAL (MG K/L)	4.00	3.90	7.20	6.60
SODIUM, TOTAL (MG NA/L)	3.30	3.30	3.40	3.70
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	6.0	6.5	6.5	7.0
FREE CARBON DIOXIDE (MG CO2/L)	27.	34.	67.	38.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.300	0.290	0.130	0.190
NITROGEN, NITRATE+NITRITE (MG N/L)	0.370	0.360	0.260	0.270
NITROGEN, DISSOLVED TKN (MG N/L)	0.38	0.43	0.45	0.32
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.45	0.45	0.88	0.94
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.041	0.042	0.062	0.040
PHOSPHATE, ORTHO (MG P/L)	0.042	0.049	0.032	0.039
PHOSPHATE, TOTAL (MG P/L)	0.560	0.570	0.890	0.650
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	6.	--	4.	--
COD (MG/L)	35.0	--	56.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	1400	960	1200	950
TOTAL COLIFORM (/100ML)	3300	3100	7500	7500
FECAL STREPTOCOCCI (/100ML)	35000	34000	12000	13000
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	--*	3.70	--*	--*

*Excessive silt and clay in sample.

Table C-2 (Continued, Page 3 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/11/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 5-A 2/11/81	STATION 5-B 2/11/81	STATION 6-A 2/11/81	STATION 6-B 2/11/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	240.	220.	36.	38.
TURBIDITY, HACH TURBIDIMETER (FTU)	400.00	310.00	38.00	39.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	560.	650.	77.	79.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	9.	7.	16.	16.
CHLORIDE (MG CL/L)	1.9	1.6	1.6	1.7
CALCIUM, TOTAL (MG CA/L)	1.9	1.6	--†	1.7
HARDNESS, TOTAL (MG CACO3/L)	14.	16.	12.	13.
IRON, DISSOLVED (MG FE/L)	0.60	0.48	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	20.00	17.00	4.50	2.80
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.49	0.54	0.37	0.12
POTASSIUM, TOTAL (MG K/L)	3.80	3.60	3.30	1.40
SODIUM, TOTAL (MG NA/L)	1.60	1.60	--†	2.60
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	7.0	7.0	2.5	2.5
FREE CARBON DIOXIDE (MG CO2/L)	21.	15.	30.	26.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.170	0.180	0.049	0.064
NITROGEN, NITRATE+NITRITE (MG N/L)	0.430	0.430	0.180	0.120
NITROGEN, DISSOLVED TKN (MG N/L)	0.35	0.33	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.95	0.55	< 0.25	0.27
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.032	0.033	0.012	0.013
PHOSPHATE, ORTHO (MG P/L)	0.049	0.035	0.015	0.024
PHOSPHATE, TOTAL (MG P/L)	0.660	0.620	0.290	0.190
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	4.	--	3.	--
COD (MG/L)	55.0	--	7.6	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	1400	1600	470	380
TOTAL COLIFORM (/100ML)	2600	3700	9600	12000
FECAL STREPTOCOCCI (/100ML)	18000	19000	10000	11000
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	--*	--*	4.90	4.10

*Excessive silt and clay in sample.

†Insufficient sample volume.

Table C-2 (Continued, Page 4 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/11/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 2/11/81	STATION 7-B 2/11/81	STATION 8-A 2/11/81	STATION 8-B 2/11/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	240.	160.	2.	5.
TURBIDITY, HACH TURBIDIMETER (FTU)	250.00	270.00	3.00	3.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	420.	500.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	11.	7.	17.	15.
CHLORIDE (MG CL/L)	2.1	2.3	1.4	1.3
CALCIUM, TOTAL (MG CA/L)	2.0	2.1	1.3	2.1
HARDNESS, TOTAL (MG CACO3/L)	--†	22.	7.	10.
IRON, DISSOLVED (MG FE/L)	0.45	0.43	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	29.00	16.00	< 0.20	0.30
MANGANESE, DISSOLVED (MG MN/L)	0.06	0.06	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.40	0.49	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	5.30	6.60	4.70	1.20
SODIUM, TOTAL (MG NA/L)	2.30	2.30	2.40	2.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	6.0	6.5	1.5	1.5
FREE CARBON DIOXIDE (MG CO2/L)	51.	52.	39.	55.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.350	0.350	0.006	0.022
NITROGEN, NITRATE+NITRITE (MG N/L)	0.460	0.430	0.180	0.160
NITROGEN, DISSOLVED TKN (MG N/L)	0.51	0.46	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	1.00	0.57	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.050	0.050	0.003	0.002
PHOSPHATE, ORTHO (MG P/L)	-- †	0.052	0.002	0.005
PHOSPHATE, TOTAL (MG P/L)	0.630	0.560	0.005	<0.002
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	5.	--	2.	< --
COD (MG/L)	41.0	--	1.5	< --
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	2000	2400	4	3
TOTAL COLIFORM (/100ML)	4900	6400	15	17
FECAL STREPTOCOCCI (/100ML)	20000	21000	20	16
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	--*	3.80	1.10	1.40

*Excessive silt and clay in sample.

†Insufficient sample volume.

Table C-2 (Continued, Page 5 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/11/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 2/11/81	STATION 9-B 2/11/81	STATION 10-A 2/11/81	STATION 10-B 2/11/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	130.	160.	5.	5.
TURBIDITY, HACH TURBIDIMETER (FTU)	180.00	170.00	3.00	3.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	260.	260.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	7.	5.	13.	13.
CHLORIDE (MG CL/L)	1.9	2.0	1.5	1.4
CALCIUM, TOTAL (MG CA/L)	1.8	1.7	1.6	1.3
HARDNESS, TOTAL (MG CACO3/L)	17.	17.	5.	10.
IRON, DISSOLVED (MG FE/L)	1.80	0.71	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	16.00	8.10	0.22	0.31
MANGANESE, DISSOLVED (MG MN/L)	0.07	0.06	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.24	0.22	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	3.90	3.40	0.55	0.90
SODIUM, TOTAL (MG NA/L)	1.90	1.90	2.40	2.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	5.0	6.0	1.5	2.0
FREE CARBON DIOXIDE (MG CO2/L)	60.	54.	47.	61.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.150	0.160	<0.005	0.022
NITROGEN, NITRATE+NITRITE (MG N/L)	0.520	0.500	0.160	0.170
NITROGEN, DISSOLVED TKN (MG N/L)	0.31	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.72	0.35	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.043	0.044	0.003	0.002
PHOSPHATE, ORTHO (MG P/L)	0.040	0.040	0.002	0.004
PHOSPHATE, TOTAL (MG P/L)	0.680	0.610	0.002	0.003
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	5.	--	2.	--
COD (MG/L)	33.0	--	2.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	500	800	4	8
TOTAL COLIFORM (/100ML)	>15000	>16000	6	9
FECAL STREPTOCOCCI (/100ML)	27000	26000	26	26
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	--*	--*	1.10	1.60

*Excessive silt and clay in sample.

Table C-3

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/13/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 2/13/81	STATION 1-B 2/13/81	STATION 2-A 2/13/81	STATION 2-B 2/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	80.	85.	85.	95.
TURBIDITY, HACH TURBIDIMETER (FTU)	25.00	22.00	33.00	35.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	21.	18.	31.	31.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	20.	18.	27.	27.
CHLORIDE (MG CL/L)	1.9	1.8	3.0	3.1
CALCIUM, TOTAL (MG CA/L)	1.8	1.8	2.5	2.0
HARDNESS, TOTAL (MG CACO3/L)	13.	13.	18.	15.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.91	1.10	1.90	1.60
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.06	0.06	0.08	0.09
POTASSIUM, TOTAL (MG K/L)	1.50	1.70	1.90	1.90
SODIUM, TOTAL (MG NA/L)	2.80	2.60	4.30	4.30
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	2.0	1.5	2.5	2.0
FREE CARBON DIOXIDE (MG CO2/L)	23.	21.	31.	31.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.049	0.038	0.034	0.032
NITROGEN, NITRATE+NITRITE (MG N/L)	0.120	0.110	0.190	0.180
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	0.34
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.042	0.042	0.022	0.017
PHOSPHATE, ORTHO (MG P/L)	0.044	0.042	0.019	0.020
PHOSPHATE, TOTAL (MG P/L)	0.099	0.097	0.094	0.099
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	1.	--
COD (MG/L)	4.5	--	6.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	130	60	70	110
TOTAL COLIFORM (/100ML)	3400	2000	7000	7200
FECAL STREPTOCOCCI (/100ML)	1000	1200	110	250
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.90	2.20	--*	5.10

*Excessive silt and clay in sample.

Table C-3 (Continued, Page 5 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/13/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 2/13/81	STATION 9-B 2/13/81	STATION 10-A 2/13/81	STATION 10-B 2/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	90.	95.	16.	15.
TURBIDITY, HACH TURBIDIMETER (FTU)	25.00	23.00	3.00	2.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	18.	22.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	17.	16.	16.	18.
CHLORIDE (MG CL/L)	2.8	2.8	1.2	1.1
CALCIUM, TOTAL (MG CA/L)	2.0	1.9	1.3	1.1
HARDNESS, TOTAL (MG CACO3/L)	18.	16.	8.	8.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.50	1.40	0.30	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.08	0.08	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.80	1.50	1.10	0.91
SODIUM, TOTAL (MG NA/L)	3.60	3.50	2.30	2.30
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	1.5	1.5	1.0	1.0
FREE CARBON DIOXIDE (MG CO2/L)	24.	29.	29.	27.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.160	0.160	0.099	0.032
NITROGEN, NITRATE+NITRITE (MG N/L)	0.170	0.170	0.075	0.074
NITROGEN, DISSOLVED TKN (MG N/L)	0.31	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.41	0.30	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.021	0.021	0.002	0.002
PHOSPHATE, ORTHO (MG P/L)	0.020	0.020	0.003	0.003
PHOSPHATE, TOTAL (MG P/L)	0.012	0.012	0.008	0.009
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	4.5	--	4.5	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	140	190	1	< 1
TOTAL COLIFORM (/100ML)	1200	1200	1	< 1
FECAL STREPTOCOCCI (/100ML)	840	1000	5	6
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.10	1.30	0.91	0.70

Table C-3 (Continued, Page 6 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/13/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 11-A 2/13/81	STATION 11-B 2/13/81
PHYSICAL DATA		
LABORATORY DATA		
COLOR (PT-CO UNITS)	440.	440.
TURBIDITY, HACH TURBIDIMETER (FTU)	38.00	37.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	24.	24.
CHEMICAL DATA		
MINERALS AND METALS		
ALKALINITY, TOTAL (MG CACO3/L)	39.	39.
CHLORIDE (MG CL/L)	8.1	8.2
CALCIUM, TOTAL (MG CA/L)	6.7	6.9
HARDNESS, TOTAL (MG CACO3/L)	35.	30.
IRON, DISSOLVED (MG FE/L)	1.20	0.90
IRON, TOTAL (MG FE/L)	1.40	1.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.10	0.10
POTASSIUM, TOTAL (MG K/L)	12.00	2.50
SODIUM, TOTAL (MG NA/L)	19.00	19.00
NUTRIENTS		
CARBON, TOTAL ORGANIC (MG C/L)	14.0	18.0
FREE CARBON DIOXIDE (MG CO2/L)	11.	11.
NITROGEN, TOTAL AMMONIA (MG N/L)	1.800	1.800
NITROGEN, NITRATE+NITRITE (MG N/L)	0.058	0.054
NITROGEN, DISSOLVED TKN (MG N/L)	2.50	2.50
NITROGEN, TOTAL KJELDAHL (MG N/L)	-- *	2.90
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.180	0.170
PHOSPHATE, ORTHO (MG P/L)	0.190	0.180
PHOSPHATE, TOTAL (MG P/L)	0.430	0.420
DEMAND GROUP		
BOD, 5 DAY, 20DEG C (MG/L)	10.	--
COD (MG/L)	54.0	--
BIOLOGICAL DATA		
BACTERIOLOGICAL DATA		
FECAL COLIFORM (/100ML)	400	450
TOTAL COLIFORM (/100ML)	-- †	-- †
FECAL STREPTOCOCCI (/100ML)	860	940
BIOMASS MEASUREMENTS		
CHLOROPHYLL-A (UG/L)	3.90	4.10

*Sample past holding time.

†Colonies overgrown; could not count.

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/13/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 2/13/81	STATION 7-B 2/13/81	STATION 8-A 2/13/81	STATION 8-B 2/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	95.	120.	13.	16.
TURBIDITY, HACH TURBIDIMETER (FTU)	26.00	26.00	2.00	2.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	21.	23.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	19.	19.	16.	16.
CHLORIDE (MG CL/L)	2.6	2.6	1.2	1.4
CALCIUM, TOTAL (MG CA/L)	2.4	2.3	1.7	1.9
HARDNESS, TOTAL (MG CACO3/L)	15.	17.	9.	6.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.30	1.30	< 0.20	0.23
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.06	0.08	< 0.05	--*
POTASSIUM, TOTAL (MG K/L)	4.60	1.80	1.10	0.86
SODIUM, TOTAL (MG NA/L)	3.20	3.30	2.40	2.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	2.0	2.0	2.0	1.5
FREE CARBON DIOXIDE (MG CO2/L)	22.	17.	23.	19.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.096	0.083	0.033	0.031
NITROGEN, NITRATE+NITRITE (MG N/L)	0.200	0.200	0.074	0.067
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.34	0.31	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.017	0.013	0.004	0.002
PHOSPHATE, ORTHO (MG P/L)	0.015	0.016	0.008	0.007
PHOSPHATE, TOTAL (MG P/L)	0.079	0.074	0.008	0.010
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	5.5	--	4.9	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	170	190	< 1	< 1
TOTAL COLIFORM (/100ML)	530	600	2	4
FECAL STREPTOCOCCI (/100ML)	560	580	3	< 1
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.50	2.10	0.61	0.68

*Insufficient sample volume.

Table C-3 (Continued, Page 5 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/13/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 2/13/81	STATION 9-B 2/13/81	STATION 10-A 2/13/81	STATION 10-B 2/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	90.	95.	16.	15.
TURBIDITY, HACH TURBIDIMETER (FTU)	25.00	23.00	3.00	2.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	18.	22.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	17.	16.	16.	18.
CHLORIDE (MG CL/L)	2.8	2.8	1.2	1.1
CALCIUM, TOTAL (MG CA/L)	2.0	1.9	1.3	1.1
HARDNESS, TOTAL (MG CACO3/L)	18.	16.	8.	8.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.50	1.40	0.30	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.08	0.08	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.80	1.50	1.10	0.91
SODIUM, TOTAL (MG NA/L)	3.60	3.50	2.30	2.30
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	1.5	1.5	1.0	1.0
FREE CARBON DIOXIDE (MG CO2/L)	24.	29.	29.	27.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.160	0.160	0.099	0.032
NITROGEN, NITRATE+NITRITE (MG N/L)	0.170	0.170	0.075	0.074
NITROGEN, DISSOLVED TKN (MG N/L)	0.31	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.41	0.30	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.021	0.021	0.002	0.002
PHOSPHATE, ORTHO (MG P/L)	0.020	0.020	0.003	0.003
PHOSPHATE, TOTAL (MG P/L)	0.012	0.012	0.008	0.009
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	4.5	--	4.5	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	140	190	1	< 1
TOTAL COLIFORM (/100ML)	1200	1200	1	< 1
FECAL STREPTOCOCCI (/100ML)	840	1000	5	6
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.10	1.30	0.91	0.70

Table C-3 (Continued, Page 6 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 2/13/1981

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 11-A 2/13/81	STATION 11-B 2/13/81
PHYSICAL DATA		
LABORATORY DATA		
COLOR (PT-CO UNITS)	440.	440.
TURBIDITY, HACH TURBIDIMETER (FTU)	38.00	37.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	24.	24.
CHEMICAL DATA		
MINERALS AND METALS		
ALKALINITY, TOTAL (MG CACO3/L)	39.	39.
CHLORIDE (MG CL/L)	8.1	8.2
CALCIUM, TOTAL (MG CA/L)	6.7	6.9
HARDNESS, TOTAL (MG CACO3/L)	35.	30.
IRON, DISSOLVED (MG FE/L)	1.20	0.90
IRON, TOTAL (MG FE/L)	1.40	1.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.10	0.10
POTASSIUM, TOTAL (MG K/L)	12.00	2.50
SODIUM, TOTAL (MG NA/L)	19.00	19.00
NUTRIENTS		
CARBON, TOTAL ORGANIC (MG C/L)	14.0	18.0
FREE CARBON DIOXIDE (MG CO2/L)	11.	11.
NITROGEN, TOTAL AMMONIA (MG N/L)	1.800	1.800
NITROGEN, NITRATE+NITRITE (MG N/L)	0.058	0.054
NITROGEN, DISSOLVED TKN (MG N/L)	2.50	2.50
NITROGEN, TOTAL KJELDAHL (MG N/L)	-- *	2.90
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.160	0.170
PHOSPHATE, ORTHO (MG P/L)	0.190	0.180
PHOSPHATE, TOTAL (MG P/L)	0.430	0.420
DEMAND GROUP		
BOD, 5 DAY, 20DEG C (MG/L)	10.	--
COD (MG/L)	54.0	--
BIOLOGICAL DATA		
BACTERIOLOGICAL DATA		
FECAL COLIFORM (/100ML)	400	450
TOTAL COLIFORM (/100ML)	-- †	-- †
FECAL STREPTOCOCCI (/100ML)	860	940
BIOMASS MEASUREMENTS		
CHLOROPHYLL-A (UG/L)	3.90	4.10

*Sample past holding time.

†Colonies overgrown; could not count.

Table C-4

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/13/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 7/13/81	STATION 1-B 7/13/81	STATION 2-A 7/13/81	STATION 2-B 7/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	39.	100.	90.	45.
TURBIDITY, HACH TURBIDIMETER (FTU)	55.00	55.00	19.00	19.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	29.	29.	11.	11.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	57.	60.	32.	32.
CHLORIDE (MG CL/L)	2.8	2.8	3.3	3.4
CALCIUM, TOTAL (MG CA/L)	5.9	6.1	1.8	2.5
HARDNESS, TOTAL (MG CACO3/L)	24.	25.	14.	15.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	2.70	2.70	0.96	1.30
MANGANESE, DISSOLVED (MG MN/L)	0.28	0.23	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.38	0.36	< 0.05	0.07
POTASSIUM, TOTAL (MG K/L)	2.10	2.10	1.20	1.80
SODIUM, TOTAL (MG NA/L)	3.30	3.50	3.10	4.20
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	9.0	8.5	8.5	5.5
FREE CARBON DIOXIDE (MG CO2/L)	4.	5.	5.	5.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.120	0.120	0.035	0.035
NITROGEN, NITRATE+NITRITE (MG N/L)	0.190	0.190	0.200	0.200
NITROGEN, DISSOLVED TKN (MG N/L)	0.44	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.30	0.41	0.25	0.28
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.033	0.010	<0.005	<0.005
PHOSPHATE, ORTHO (MG P/L)	0.008	0.008	<0.005	0.005
PHOSPHATE, TOTAL (MG P/L)	0.090	0.088	0.046	0.049
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	1.	--	< 1.	--
COD (MG/L)	4.2	--	11.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	40	60	20	30
TOTAL COLIFORM (/100ML)	200	200	500	400
FECAL STREPTOCOCCI (/100ML)	390	390	70	68
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	2.90	1.60	0.87	1.10

Table C-4 (Continued, Page 2 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/13/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 3-A 7/13/81	STATION 3-B 7/13/81	STATION 4-A 7/13/81	STATION 4-B 7/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	42.	47.	170.	180.
TURBIDITY, HACH TURBIDIMETER (FTU)	6.30	6.30	45.00	50.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	50.	50.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	45.	45.	35.	32.
CHLORIDE (MG CL/L)	4.1	4.3	8.4	7.2
CALCIUM, TOTAL (MG CA/L)	3.4	3.4	4.4	3.9
HARDNESS, TOTAL (MG CACO3/L)	16.	17.	22.	22.
IRON, DISSOLVED (MG FE/L)	< 0.20	0.20	0.22	< 0.20
IRON, TOTAL (MG FE/L)	0.60	0.64	4.40	4.60
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	0.08	0.10
MANGANESE, TOTAL (MG MN/L)	0.09	0.09	0.25	0.23
POTASSIUM, TOTAL (MG K/L)	2.10	2.10	2.80	2.60
SODIUM, TOTAL (MG NA/L)	5.10	5.60	7.40	6.20
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	6.5	7.0	11.0	8.5
FREE CARBON DIOXIDE (MG CO2/L)	5.	8.	12.	56.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.051	0.054	0.069	0.062
NITROGEN, NITRATE+NITRITE (MG N/L)	0.170	0.160	0.360	0.370
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	0.29
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	0.25	0.50	0.42
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	<0.005	0.008	0.026	0.034
PHOSPHATE, ORTHO (MG P/L)	0.009	0.005	0.029	0.016
PHOSPHATE, TOTAL (MG P/L)	0.028	0.039	0.140	0.150
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	1.	--
COD (MG/L)	7.6	--	11.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	27	22	21	26
TOTAL COLIFORM (/100ML)	200	200	1100	> 800
FECAL STREPTOCOCCI (/100ML)	280	200	1300	1200
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	3.10	3.40	3.80	4.00

Table C-4 (Continued, Page 3 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/13/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 5-A 7/13/81	STATION 5-B 7/13/81	STATION 6-A 7/13/81	STATION 6-B 7/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	60.	70.	11.	11.
TURBIDITY, HACH TURBIDIMETER (FTU)	12.00	12.00	0.90	2.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	28.	29.	19.	20.
CHLORIDE (MG CL/L)	2.4	13.0	2.3	2.0
CALCIUM, TOTAL (MG CA/L)	2.3	2.0	1.3	1.6
HARDNESS, TOTAL (MG CACO3/L)	14.	11.	7.	6.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.00	0.63	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.07	< 0.05	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.00	2.10	1.30	1.10
SODIUM, TOTAL (MG NA/L)	2.50	2.30	2.70	2.70
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	9.0	4.0	6.5	4.5
FREE CARBON DIOXIDE (MG CO2/L)	6.	6.	5.	7.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.038	0.026	0.032	0.026
NITROGEN, NITRATE+NITRITE (MG N/L)	0.330	0.320	0.120	0.120
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	-- *	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.25	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.006	0.012	< -- *	0.050
PHOSPHATE, ORTHO (MG P/L)	0.008	0.005	0.043	0.043
PHOSPHATE, TOTAL (MG P/L)	0.029	0.018	0.054	0.069
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	13.0	--	8.1	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	51	54	15	--†
TOTAL COLIFORM (/100ML)	210	210	23	27
FECAL STREPTOCOCCI (/100ML)	8400	5700	230	200
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	0.99	0.79	0.25	--

*Sample lost.

†Colonies overgrown; could not count.

Table C-4 (Continued, Page 4 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/13/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 7/13/81	STATION 7-B 7/13/81	STATION 8-A 7/13/81	STATION 8-B 7/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	100.	100.	30.	27.
TURBIDITY, HACH TURBIDIMETER (FTU)	13.00	13.00	4.20	4.20
TOTAL NONFILTERABLE RESIDUE (MG/L)	7.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	38.	38.	29.	26.
CHLORIDE (MG CL/L)	2.7	3.1	4.8	12.0
CALCIUM, TOTAL (MG CA/L)	2.8	3.0	2.3	2.5
HARDNESS, TOTAL (MG CACO3/L)	15.	15.	11.	11.
IRON, DISSOLVED (MG FE/L)	0.24	0.29	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.30	1.20	0.24	0.45
MANGANESE, DISSOLVED (MG MN/L)	0.09	0.09	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.13	0.14	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.30	2.40	1.60	1.60
SODIUM, TOTAL (MG NA/L)	4.20	4.10	5.30	5.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	8.5	8.5	8.0	7.0
FREE CARBON DIOXIDE (MG CO2/L)	11.	11.	13.	11.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.038	0.066	0.026	0.029
NITROGEN, NITRATE+NITRITE (MG N/L)	0.310	0.320	0.550	0.560
NITROGEN, DISSOLVED TKN (MG N/L)	0.28	0.29	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.25	0.25	0.26	0.26
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.048	0.034	0.080	0.072
PHOSPHATE, ORTHO (MG P/L)	0.046	0.045	0.076	0.076
PHOSPHATE, TOTAL (MG P/L)	0.800	0.810	0.160	0.150
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	6.3	12.0	9.1	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	790	110	23	--*
TOTAL COLIFORM (/100ML)	400	500	300	200
FECAL STREPTOCOCCI (/100ML)	3200	5200	63	74
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.50	1.10	0.87	0.77

*Colonies overgrown; could not count.

Table C-4 (Continued, Page 5 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/13/81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 7/13/81	STATION 9-B 7/13/81	STATION 10-A 7/13/81	STATION 10-B 7/13/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	90.	110.	10.	3.
TURBIDITY, HACH TURBIDIMETER (FTU)	16.00	14.00	0.90	0.90
TOTAL NON-FILTERABLE RESIDUE (MG/L)	< 5.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	34.	32.	19.	20.
CHLORIDE (MG CL/L)	5.1	5.3	4.4	10.0
CALCIUM, TOTAL (MG CA/L)	2.0	2.0	1.8	1.3
HARDNESS, TOTAL (MG CACO3/L)	12.	11.	8.	9.
IRON, DISSOLVED (MG FE/L)	0.24	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.70	1.90	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	0.06	0.06	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.09	0.07	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.20	2.30	1.20	1.20
SODIUM, TOTAL (MG NA/L)	6.30	6.70	2.00	2.00
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	9.5	7.0	14.0	4.0
FREE CARBON DIOXIDE (MG CO2/L)	19.	16.	26.	28.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.058	0.068	0.032	0.035
NITROGEN, NITRATE+NITRITE (MG N/L)	0.500	0.620	0.180	0.160
NITROGEN, DISSOLVED TKN (MG N/L)	0.26	0.31	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.44	0.39	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.160	0.160	<0.005	<0.005
PHOSPHATE, ORTHO (MG P/L)	0.160	0.170	<0.005	<0.005
PHOSPHATE, TOTAL (MG P/L)	0.350	0.370	0.004	0.007
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	7.0	--	8.1	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	470	590	8	11
TOTAL COLIFORM (/100ML)	2500	2600	48	42
FECAL STREPTOCOCCI (/100ML)	1600	1500	490	900
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.90	1.50	0.58	0.45

Table C-5

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/15/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 7/15/81	STATION 1-B 7/15/81	STATION 2-A 7/15/81	STATION 2-B 7/15/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	16.	23.	21.	44.
TURBIDITY, HACH TURBIDIMETER (FTU)	6.40	5.40	7.50	6.40
TOTAL NONFILTERABLE RESIDUE (MG/L)	8.	7.	9.	6.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	18.	18.	26.	26.
CHLORIDE (MG CL/L)	1.9	1.9	3.2	2.6
CALCIUM, TOTAL (MG CA/L)	1.7	2.0	2.4	2.0
HARDNESS, TOTAL (MG CACO3/L)	9.	10.	11.	13.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.36	0.42	0.67	0.47
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	< 0.05	0.06	< 0.05	0.06
POTASSIUM, TOTAL (MG K/L)	1.10	0.94	1.30	1.30
SODIUM, TOTAL (MG NA/L)	2.30	2.20	3.30	3.10
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	3.0	3.5	6.5	3.5
FREE CARBON DIOXIDE (MG CO2/L)	16.	25.	18.	16.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.020	0.021	0.033	0.029
NITROGEN, NITRATE+NITRITE (MG N/L)	0.220	0.240	0.160	0.170
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.090	0.094	0.130	0.120
PHOSPHATE, ORTHO (MG P/L)	0.087	0.090	0.120	0.130
PHOSPHATE, TOTAL (MG P/L)	0.010	0.020	0.030	0.024
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	4.	--
COD (MG/L)	1.4	--	4.2	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	20	48	14	18
TOTAL COLIFORM (/100ML)	360	160	60	110
FECAL STREPTOCOCCI (/100ML)	150	170	440	420
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	0.91	2.30	2.20	1.90

Table C-5 (Continued, Page 2 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/15/81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 3-A 7/15/81	STATION 3-B 7/15/81	STATION 4-A 7/15/81	STATION 4-B 7/15/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	30.	30.	90.	100.
TURBIDITY, HACH TURBIDIMETER (FTU)	5.40	5.40	26.00	27.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	35.	34.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	44.	47.	46.	48.
CHLORIDE (MG CL/L)	4.3	4.2	8.5	8.5
CALCIUM, TOTAL (MG CA/L)	4.0	3.7	4.1	4.4
HARDNESS, TOTAL (MG CACO3/L)	17.	16.	20.	20.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.48	0.56	2.90	1.90
MANGANESE, DISSOLVED (MG MN/L)	0.09	0.06	0.11	0.12
MANGANESE, TOTAL (MG MN/L)	0.11	0.09	0.22	0.22
POTASSIUM, TOTAL (MG K/L)	1.90	1.90	2.40	2.40
SODIUM, TOTAL (MG NA/L)	5.00	4.60	7.40	7.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	5.0	3.5	8.5	7.5
FREE CARBON DIOXIDE (MG CO2/L)	12.	10.	6.	7.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.045	0.050	0.057	0.054
NITROGEN, NITRATE+NITRITE (MG N/L)	0.120	0.120	0.490	0.480
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	0.27	0.32
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	0.36	0.36
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	<0.002	0.050	0.099	0.110
PHOSPHATE, ORTHO (MG P/L)	0.100	0.100	0.120	0.120
PHOSPHATE, TOTAL (MG P/L)	0.018	0.020	0.140	0.170
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	3.	--	5.	--
COD (MG/L)	7.0	--	13.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	30	29	120	160
TOTAL COLIFORM (/100ML)	150	140	1300	700
FECAL STREPTOCOCCI (/100ML)	640	1700	2400	3100
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	5.80	5.20	9.10	9.20

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/15/81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 5-A 7/15/81	STATION 5-B 7/15/81	STATION 6-A 7/15/81	STATION 6-B 7/15/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	65.	60.	3.	5.
TURBIDITY, HACH TURBIDIMETER (FTU)	9.50	9.50	1.30	2.30
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	30.	30.	18.	17.
CHLORIDE (MG CL/L)	2.3	2.5	2.0	2.2
CALCIUM, TOTAL (MG CA/L)	2.0	2.5	1.8	1.4
HARDNESS, TOTAL (MG CACO3/L)	11.	11.	3.	7.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.59	0.65	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	0.06	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	< 0.05	0.06	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.70	1.60	0.97	0.94
SODIUM, TOTAL (MG NA/L)	2.50	2.30	2.50	1.70
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	4.0	3.0	4.0	2.5
FREE CARBON DIOXIDE (MG CO2/L)	8.	5.	8.	9.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.013	0.030	0.020	0.018
NITROGEN, NITRATE+NITRITE (MG N/L)	0.280	0.300	0.200	0.200
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.120	0.110	0.071	0.065
PHOSPHATE, ORTHO (MG P/L)	0.130	0.130	0.070	0.071
PHOSPHATE, TOTAL (MG P/L)	0.024	0.047	<0.005	<0.005
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	1.	--	< 1.	--
COD (MG/L)	2.7	--	7.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	120	90	--*	--*
TOTAL COLIFORM (/100ML)	60	40	11	22
FECAL STREPTOCOCCI (/100ML)	720	800	15	11
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	0.38	0.89	0.18	0.18

*Colonies too numerous to count.

Table C-5 (Continued, Page 4 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/15/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 7/15/81	STATION 7-B 7/15/81	STATION 8-A 7/15/81	STATION 8-B 7/15/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	85.	90.	20.	19.
TURBIDITY, HACH TURBIDIMETER (FTU)	13.00	12.00	4.40	4.40
TOTAL NONFILTERABLE RESIDUE (MG/L)	6.	7.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	40.	39.	19.	20.
CHLORIDE (MG CL/L)	2.8	3.1	2.5	2.0
CALCIUM, TOTAL (MG CA/L)	3.7	3.4	1.9	1.8
HARDNESS, TOTAL (MG CACO3/L)	15.	14.	9.	12.
IRON, DISSOLVED (MG FE/L)	0.24	0.21	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.10	1.00	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	0.14	0.14	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.13	0.13	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.20	2.30	1.10	1.20
SODIUM, TOTAL (MG NA/L)	3.50	3.80	2.90	3.00
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	4.0	4.5	3.5	3.5
FREE CARBON DIOXIDE (MG CO2/L)	6.	5.	7.	7.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.013	0.025	0.020	0.020
NITROGEN, NITRATE+NITRITE (MG N/L)	0.340	0.340	0.310	0.290
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	0.27	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.098	0.100	0.110	0.120
PHOSPHATE, ORTHO (MG P/L)	0.093	0.100	0.120	0.110
PHOSPHATE, TOTAL (MG P/L)	0.032	0.052	0.018	0.037
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	1.	--	2.	--
COD (MG/L)	2.3	--	2.3	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	190	250	8	7
TOTAL COLIFORM (/100ML)	1200	1600	120	100
FECAL STREPTOCOCCI (/100ML)	8200	5800	510	890
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.50	1.00	< 0.10	0.47

Table C-5 (Continued, Page 5 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0025
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/15/81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 7/15/81	STATION 9-B 7/15/81	STATION 10-A 7/15/81	STATION 10-B 7/15/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	110.	65.	3.	7.
TURBIDITY, HACH TURBIDIMETER (FTU)	15.00	16.00	1.30	1.30
TOTAL NONFILTERABLE RESIDUE (MG/L)	6.	6.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	33.	32.	22.	20.
CHLORIDE (MG CL/L)	4.6	4.7	1.9	1.7
CALCIUM, TOTAL (MG CA/L)	2.6	3.8	1.4	1.6
HARDNESS, TOTAL (MG CACO3/L)	11.	18.	8.	6.
IRON, DISSOLVED (MG FE/L)	0.23	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.60	1.70	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	0.09	0.09	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.08	0.11	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.30	2.10	0.96	0.90
SODIUM, TOTAL (MG NA/L)	6.60	6.20	2.20	2.10
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	4.0	4.5	4.0	2.5
FREE CARBON DIOXIDE (MG CO2/L)	9.	9.	15.	14.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.051	0.045	0.011	0.014
NITROGEN, NITRATE+NITRITE (MG N/L)	0.500	0.520	0.180	0.180
NITROGEN, DISSOLVED TKN (MG N/L)	0.26	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.34	0.26	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.150	0.160	0.120	0.110
PHOSPHATE, ORTHO (MG P/L)	0.170	0.170	0.110	0.100
PHOSPHATE, TOTAL (MG P/L)	0.260	0.250	0.008	0.014
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	2.	--
COD (MG/L)	1.4	3.3	3.6	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	72	66	7	7
TOTAL COLIFORM (/100ML)	9900	8100	180	150
FECAL STREPTOCOCCI (/100ML)	4400	4200	46	36
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.20	1.40	0.19	< 0.10

Table C-5 (Continued, Page 6 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/15/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 11-A 7/15/81	STATION 11-B 7/15/81	STATION 12-A 7/15/81	STATION 12-B 7/15/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	300.	300.	110.	100.
TURBIDITY, HACH TURBIDIMETER (FTU)	24.00	23.00	45.00	45.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	42.	40.	36.	36.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	63.	63.	70.	72.
CHLORIDE (MG CL/L)	13.0	13.0	4.2	4.3
CALCIUM, TOTAL (MG CA/L)	9.2	8.7	12.0	12.0
HARDNESS, TOTAL (MG CACO3/L)	40.	41.	57.	57.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.60	1.60	4.50	3.90
MANGANESE, DISSOLVED (MG MN/L)	0.07	0.06	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.08	0.10	0.06	< 0.05
POTASSIUM, TOTAL (MG K/L)	4.30	4.30	1.50	1.60
SODIUM, TOTAL (MG NA/L)	37.00	37.00	7.90	8.20
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	30.0	34.0	3.5	3.0
FREE CARBON DIOXIDE (MG CO2/L)	2.	2.	2.	1.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.061	0.061	0.012	0.015
NITROGEN, NITRATE+NITRITE (MG N/L)	0.490	0.460	0.130	0.120
NITROGEN, DISSOLVED TKN (MG N/L)	1.20	1.20	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	3.30	3.40	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.570	0.560	0.220	0.220
PHOSPHATE, ORTHO (MG P/L)	0.570	0.610	0.240	0.240
PHOSPHATE, TOTAL (MG P/L)	0.920	0.940	0.086	0.095
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	16.	--	< 1.	--
COD (MG/L)	79.0	--	2.7	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	83	73	76	59
TOTAL COLIFORM (/100ML)	1200	1000	2600	1600
FECAL STREPTOCOCCI (/100ML)	8100	9700	5800	1200
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	420.00	400.00	13.00	1.30

Table C-6

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/17/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 7/17/81	STATION 1-B 7/17/81	STATION 2-A 7/17/81	STATION 2-B 7/17/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	20.	20.	21.	21.
TURBIDITY, HACH TURBIDIMETER (FTU)	7.70	5.60	4.00	4.60
TOTAL NONFILTERABLE RESIDUE (MG/L)	6.	6.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	19.	19.	25.	25.
CHLORIDE (MG CL/L)	1.9	2.1	3.0	3.0
CALCIUM, TOTAL (MG CA/L)	1.5	1.0	1.2	1.5
HARDNESS, TOTAL (MG CACO3/L)	9.	9.	11.	11.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.48	0.69	0.43	0.46
MANGANESE, DISSOLVED (MG MN/L)	< 0.05	0.06	< 0.05	--*
MANGANESE, TOTAL (MG MN/L)	0.07	0.07	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.20	1.30	1.30	1.60
SODIUM, TOTAL (MG NA/L)	2.50	2.30	3.40	3.90
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	3.0	2.5	3.5	3.5
FREE CARBON DIOXIDE (MG CO2/L)	17.	17.	17.	17.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.120	0.083	0.090	0.170
NITROGEN, NITRATE+NITRITE (MG N/L)	0.160	0.160	0.180	0.190
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.008	0.009	0.009	<0.002
PHOSPHATE, ORTHO (MG P/L)	<0.002	0.002	0.002	0.002
PHOSPHATE, TOTAL (MG P/L)	0.019	0.023	0.019	0.017
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	7.6	--	5.6	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	40	10	30	40
TOTAL COLIFORM (/100ML)	130	60	110	130
FECAL STREPTOCOCCI (/100ML)	160	150	460	720
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	1.30	0.93	1.50	1.70

*Sample past holding time.

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/17/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 3-A 7/17/81	STATION 3-B 7/17/81	STATION 4-A 7/17/81	STATION 4-B 7/17/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	38.	31.	80.	80.
TURBIDITY, HACH TURBIDIMETER (FTU)	5.60	4.60	23.00	22.00
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	31.	31.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	44.	42.	50.	50.
CHLORIDE (MG CL/L)	4.7	4.4	11.0	11.0
CALCIUM, TOTAL (MG CA/L)	2.9	2.7	4.3	3.6
HARDNESS, TOTAL (MG CACO3/L)	17.	17.	23.	22.
IRON, DISSOLVED (MG FE/L)	0.24	< 0.20	0.27	0.25
IRON, TOTAL (MG FE/L)	0.66	0.53	2.20	2.60
MANGANESE, DISSOLVED (MG MN/L)	0.12	0.10	0.10	0.15
MANGANESE, TOTAL (MG MN/L)	0.17	0.12	0.21	0.22
POTASSIUM, TOTAL (MG K/L)	2.20	2.20	3.30	3.10
SODIUM, TOTAL (MG NA/L)	5.00	5.10	9.10	10.00
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	6.5	4.0	4.0	5.0
FREE CARBON DIOXIDE (MG CO2/L)	19.	29.	11.	11.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.083	0.110	0.100	0.190
NITROGEN, NITRATE+NITRITE (MG N/L)	0.110	0.110	0.440	0.420
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	0.33	0.31
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	0.26	0.37	0.49
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.006	<0.002	0.038	0.029
PHOSPHATE, ORTHO (MG P/L)	<0.002	<0.002	0.033	0.029
PHOSPHATE, TOTAL (MG P/L)	0.022	0.021	0.140	0.140
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	1.	--	1.	--
COD (MG/L)	5.8	--	13.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	37	30	590	460
TOTAL COLIFORM (/100ML)	300	200	600	400
FECAL STREPTOCOCCI (/100ML)	410	390	1800	1700
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	4.10	4.10	8.50	7.90

Table C-6 (Continued, Page 3 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/17/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 5-A 7/17/81	STATION 5-B 7/17/81	STATION 6-A 7/17/81	STATION 6-B 7/17/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	75.	60.	6.	7.
TURBIDITY, HACH TURBIDIMETER (FTU)	8.70	7.70	1.50	0.50
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	26.	28.	15.	17.
CHLORIDE (MG CL/L)	2.5	2.5	2.0	1.5
CALCIUM, TOTAL (MG CA/L)	1.6	1.6	1.4	1.4
HARDNESS, TOTAL (MG CACO3/L)	11.	12.	17.	5.
IRON, DISSOLVED (MG FE/L)	< 0.20	< 0.20	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	0.70	1.00	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	0.06	< 0.05	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	< 0.05	< 0.05	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	1.90	2.10	1.10	1.10
SODIUM, TOTAL (MG NA/L)	0.98	2.70	2.50	2.20
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	[illegible]	3.0	3.5	3.0
FREE CARBON DIOXIDE (MG CO2/L)	[illegible]	20.	26.	27.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.083	0.043	0.065	0.076
NITROGEN, NITRATE+NITRITE (MG N/L)	0.350	0.310	0.190	0.180
NITROGEN, DISSOLVED TKN (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	< 0.25	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.004	0.012	0.011	<0.002
PHOSPHATE, ORTHO (MG P/L)	<0.002	<0.002	<0.002	<0.002
PHOSPHATE, TOTAL (MG P/L)	0.010	0.021	0.018	0.005
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	1.8	--	6.5	10.0
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	170	60	--*	--*
TOTAL COLIFORM (/100ML)	700	400	10	< 1
FECAL STREPTOCOCCI (/100ML)	910	770	23	16
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	0.71	0.60	0.25	0.25

*Colonies overgrown; could not count.

Table C-6 (Continued, Page 4 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/17/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 7/17/81	STATION 7-B 7/17/81	STATION 8-A 7/17/81	STATION 8-B 7/17/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	90.	100.	10.	11.
TURBIDITY, HACH TURBIDIMETER (FTU)	12.00	11.00	1.50	1.50
TOTAL NONFILTERABLE RESIDUE (MG/L)	< 5.	< 5.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	36.	38.	21.	20.
CHLORIDE (MG CL/L)	2.5	3.7	5.3	5.3
CALCIUM, TOTAL (MG CA/L)	2.8	2.3	1.5	1.5
HARDNESS, TOTAL (MG CACO3/L)	14.	15.	12.	9.
IRON, DISSOLVED (MG FE/L)	0.35	0.35	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	1.20	1.50	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	0.14	0.14	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.13	0.16	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.60	2.50	1.50	1.40
SODIUM, TOTAL (MG NA/L)	4.20	3.40	5.10	4.40
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	4.0	3.0	3.5	3.0
FREE CARBON DIOXIDE (MG CO2/L)	16.	17.	15.	16.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.074	0.062	0.074	0.130
NITROGEN, NITRATE+NITRITE (MG N/L)	0.310	0.320	0.270	0.260
NITROGEN, DISSOLVED TKN (MG N/L)	0.81	< 0.25	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	2.00	< 0.25	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.024	0.039	0.029	0.032
PHOSPHATE, ORTHO (MG P/L)	0.016	0.017	0.017	0.020
PHOSPHATE, TOTAL (MG P/L)	0.041	0.048	0.039	0.039
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	4.5	--	6.1	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	150	150	8	8
TOTAL COLIFORM (/100ML)	800	600	400	400
FECAL STREPTOCOCCI (/100ML)	2300	3200	220	360
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	2.50	1.90	< 0.10	0.39

Table C-6 (Continued, Page 5 of 5)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0025
WATER QUALITY AND BACTERIOLOGY DATA - SAVANNAH RIVER - COLLECTED 7/17/'81

WATER QUALITY SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 7/17/81	STATION 9-B 7/17/81	STATION 10-A 7/17/81	STATION 10-B 7/17/81
PHYSICAL DATA				
LABORATORY DATA				
COLOR (PT-CO UNITS)	110.	110.	3.	6.
TURBIDITY, HACH TURBIDIMETER (FTU)	16.00	16.00	0.50	0.50
TOTAL NONFILTERABLE RESIDUE (MG/L)	8.	7.	< 5.	< 5.
CHEMICAL DATA				
MINERALS AND METALS				
ALKALINITY, TOTAL (MG CACO3/L)	30.	32.	20.	16.
CHLORIDE (MG CL/L)	7.1	5.5	1.6	1.6
CALCIUM, TOTAL (MG CA/L)	1.4	1.6	1.4	1.0
HARDNESS, TOTAL (MG CACO3/L)	12.	11.	8.	9.
IRON, DISSOLVED (MG FE/L)	0.38	0.44	< 0.20	< 0.20
IRON, TOTAL (MG FE/L)	2.10	2.30	< 0.20	< 0.20
MANGANESE, DISSOLVED (MG MN/L)	0.11	0.12	< 0.05	< 0.05
MANGANESE, TOTAL (MG MN/L)	0.11	0.09	< 0.05	< 0.05
POTASSIUM, TOTAL (MG K/L)	2.70	2.70	1.20	1.10
SODIUM, TOTAL (MG NA/L)	9.30	11.00	2.80	2.30
NUTRIENTS				
CARBON, TOTAL ORGANIC (MG C/L)	5.5	4.5	2.5	2.5
FREE CARBON DIOXIDE (MG CO2/L)	13.	16.	35.	32.
NITROGEN, TOTAL AMMONIA (MG N/L)	0.110	0.220	0.046	0.074
NITROGEN, NITRATE+NITRITE (MG N/L)	0.460	0.440	0.170	0.180
NITROGEN, DISSOLVED TKN (MG N/L)	0.31	0.26	< 0.25	< 0.25
NITROGEN, TOTAL KJELDAHL (MG N/L)	0.42	0.50	< 0.25	< 0.25
ORTHOPHOSPHATE, DISSOLVED (MG P/L)	0.190	0.160	0.004	0.004
PHOSPHATE, ORTHO (MG P/L)	0.170	0.170	<0.002	<0.002
PHOSPHATE, TOTAL (MG P/L)	0.360	0.370	0.005	0.010
DEMAND GROUP				
BOD, 5 DAY, 20DEG C (MG/L)	< 1.	--	< 1.	--
COD (MG/L)	10.0	--	11.0	--
BIOLOGICAL DATA				
BACTERIOLOGICAL DATA				
FECAL COLIFORM (/100ML)	510	550	4	2
TOTAL COLIFORM (/100ML)	1000	--*	8	7
FECAL STREPTOCOCCI (/100ML)	6100	5900	37	43
BIOMASS MEASUREMENTS				
CHLOROPHYLL-A (UG/L)	3.30	3.40	0.14	< 0.10

*Colonies overgrown, could not count.

Table C-7. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Diel Water Quality Sampling Data—Collected July 16 and 17, 1981

Parameter	Diel: Station 2							Duplicate	
Time:	1045	1325	1630	1940	2230	0135	0415	0730	0730
Laboratory Data									
Total Nonfilterable Residue (mg/1)	<5	<5	<5	<5	<5	8	<5	<5	<5
Chemical Data									
Alkalinity, Total (mg $CaCO_3$/1)	21	25	—	21	20	21	21	25	25
Carbon, Total Organic (mg C/1)	5.5	3.0	3.0	4.0	2.5	5.0	2.0	3.5	3.5
Free Carbon Dioxide (mg CO_2/1)	23	28	—	12	18	18	18	17	17
Nitrogen, Total Ammonia (mg N/1)	0.068	0.024	0.150	0.150	0.020	0.145	0.028	0.090	0.169
Nitrogen, Nitrate + Nitrite (mg N/1)	0.145	0.192	0.192	0.169	0.180	0.192	0.157	0.180	0.192
Nitrogen, Dissolved TKN (mg N/1)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.27	<0.25	<0.25
Nitrogen, Total Kjeldahl (mg N/1)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25
Orthophosphate, Dissolved (mg P/1)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.013	0.009	<0.002
Orthophosphate (mg P/1)	0.005	0.005	<0.005	<0.005	<0.005	<0.005	0.010	0.002	0.002
Phosphate, Total (mg P/1)	<0.005	0.009	0.010	<0.005	<0.005	0.019	0.025	0.019	0.017

Table C-7. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Diel Water Quality Sampling Data—Collected July 16 and 17, 1981 (Continued, Page 2 of 4)

Parameter	Diel: Station 3							Duplicate	
Time:	1100	1315	1645	1915	2250	0115	0450	0715	0715
Laboratory Data									
Total Nonfilterable Residue (mg/1)	<5	<5	20	15	15	12	<5	<5	<5
Chemical Data									
Alkalinity, Total (mg $CaCO_3$/1)	42	42	41	44	22	38	39	44	42
Carbon, Total Organic (mg C/1)	3.5	4.0	4.0	4.0	4.5	4.5	3.0	6.5	4.0
Free Carbon Dioxide (mg CO_2/1)	46	19	29	15	19	33	43	19	29
Nitrogen, Total Ammonia (mg N/1)	0.067	0.024	0.100	0.086	0.099	0.212	0.054	0.083	0.113
Nitrogen, Nitrate + Nitrite (mg N/1)	0.120	0.126	0.063	0.169	0.063	0.091	0.096	0.110	0.110
Nitrogen, Dissolved TKN (mg N/1)	<0.25	<0.25	0.25	0.52	0.52	0.27	0.25	<0.25	<0.25
Nitrogen, Total Kjeldahl (mg N/1)	<0.25	0.25	0.45	0.40	0.42	0.35	0.27	<0.25	0.26
Orthophosphate, Dissolved (mg P/1)	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	0.005	0.006	<0.002
Orthophosphate (mg P/1)	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	0.005	<0.002	<0.002
Phosphate, Total (mg P/1)	0.017	0.020	0.047	0.035	0.042	0.030	0.023	0.022	0.021

Table C-7. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Diel Water Quality Sampling Data Collected—July 16 and 17, 1981 (Continued, Page 3 of 4)

	Diel: Station 4								
								Duplicate	
Parameter Time:	1010	1350	1615	1940	2215	0155	0415	0750	0750
Laboratory Data									
Total Nonfilterable Residue (mg/1)	8	18	14	15	29	35	37	31	31
Chemical Data									
Alkalinity, Total (mg $CaCO_3$/1)	47	46	44	49	46	50	47	50	50
Carbon, Total Organic (mg C/1)	7.0	4.0	4.0	4.5	4.5	6.5	5.0	4.0	5.0
Free Carbon Dioxide (mg CO_2/1)	41	2	1	3	13	14	13	11	11
Nitrogen, Total Ammonia (mg N/1)	0.041	0.128	0.094	0.037	0.029	0.083	0.057	0.102	0.189
Nitrogen, Nitrate + Nitrite (mg N/1)	0.482	0.504	0.392	0.357	0.404	0.463	0.439	0.439	0.416
Nitrogen, Dissolved TKN (mg N/1)	0.33	<0.25	0.28	0.27	<0.25	0.35	0.48	0.33	0.31
Nitrogen, Total Kjeldahl (mg N/1)	0.31	0.43	0.79	0.35	0.33	0.37	0.82	0.37	0.49
Orthophosphate, Dissolved (mg P/1)	0.030	0.034	0.034	0.030	0.034	0.036	0.045	0.038	0.029
Orthophosphate (mg P/1)	0.030	0.040	0.041	0.040	0.040	0.040	0.042	0.033	0.029
Phosphate, Total (mg P/1)	0.099	0.114	0.103	0.102	0.123	0.133	0.156	0.140	0.142

Table C-7. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Diel Water Quality Sampling Data—Collected July 16 and 17, 1981 (Continued, Page 4 of 4)

		Diel: Station 10								
									Duplicate	
Parameter	Time:	1030	1330	1630	1930	2230	0130	0430	0740	0740
Laboratory Data										
Total Nonfilterable Residue (mg/1)		<5	<5	<5	<5	<5	<5	<5	<5	<5
Chemical Data										
Alkalinity, Total (mg $CaCO_3$/1)		14	12	16	10	18	10	12	20	18
Carbon, Total Organic (mg C/1)		2.0	3.0	3.5	2.5	2.0	3.0	2.0	2.5	2.5
Free Carbon Dioxide (mg CO_2/1)		62	59	89	49	50	44	84	35	32
Nitrogen, Total Ammonia (mg N/1)		<0.010	<0.010	0.292	0.060	<0.010	0.082	0.111	0.046	0.074
Nitrogen, Nitrate + Nitrite (mg N/1)		0.180	0.192	0.204	0.204	0.216	0.292	0.192	0.174	0.180
Nitrogen, Dissolved TKN (mg N/1)		<0.25	0.78	0.30	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrogen, Total Kjeldahl (mg N/1)		<0.25	0.80	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Orthophosphate, Dissolved (mg P/1)		<0.005	<0.005	<0.005	<0.005	0.009	0.009	0.005	0.004	0.004
Orthophosphate (mg P/1)		<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.002	<0.002
Phosphate, Total (mg P/1)		<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	0.005	0.010

Source: WAR, 1981.

APPENDIX D

SEDIMENT DATA

LIST OF APPENDIX D TABLES

Table D-1

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 2/11/81	STATION 1-B 2/11/81	STATION 2-A 2/10/81	STATION 2-B 2/10/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	--	95.0	--	85.0
BED MTL (% FINER THAN 1.0 MM)	--	85.0	--	69.0
BED MTL (% FINER THAN 0.5 MM)	--	45.0	--	37.0
BED MTL (% FINER THAN 0.25 MM)	--	6.5	--	20.0
BED MTL (% FINER THAN 0.10 MM)	--	2.1	--	3.1
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	--	1.3	--	1.5
BED MTL (% FINER THAN 0.002 MM)	--	0.2	--	0.3
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.35	0.54	0.66	0.63
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	--	0.06	--	0.10
NITROGEN, TOTAL KJELDAHL (MG N/KG)	37.	33.	82.	72.
OIL & GREASE (%TOTAL DRY WT)	0.2	0.3	0.2	0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	39.	45.	49.	41.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	< 0.3	< 0.3	< 0.3	< 0.3
CADMIUM (MG CD/KG DRY WT)	0.21	0.72	0.24	0.25
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	< 3.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	0.44	< 0.30
IRON (MG FE/KG DRY WT)	1000.	[illegible]	2200.	2100.
LEAD (MG PB/KG DRY WT)	1.4	1.2	2.1	2.5
MANGANESE (MG MN/KG DRY WT)	170.	140.	450.	320.
MERCURY (MG HG/KG DRY WT)	0.004	<0.001	<0.001	0.002
NICKEL (MG NI/KG DRY WT)	6.4	< 4.0	7.6	11.0
ZINC (MG ZN/KG DRY WT)	2.1	4.6	3.6	5.0
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

Table D-1 (Continued, Page 2 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 3-A 2/12/81	STATION 3-B 2/13/81	STATION 4-A 2/ 9/81	STATION 4-B 2/ 9/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	--	92.0	58.0	--
BED MTL (% FINER THAN 1.0 MM)	--	82.0	48.0	--
BED MTL (% FINER THAN 0.5 MM)	--	55.0	26.0	--
BED MTL (% FINER THAN 0.25 MM)	--	24.0	13.0	--
BED MTL (% FINER THAN 0.10 MM)	--	8.3	4.6	--
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	--	5.3	2.5	--
BED MTL (% FINER THAN 0.002 MM)	--	1.4	0.7	--
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.92	0.87	0.76	0.82
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	--	0.17	0.10	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	120.	130.	150.	120.
OIL & GREASE (%TOTAL DRY WT)	< 0.1	0.2	0.2	< 0.065
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	51.	74.	130.	130.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	< 0.3	< 0.3	< 0.3	< 0.3
CADMIUM (MG CD/KG DRY WT)	0.24	0.39	0.22	0.17
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	< 3.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	< 0.30	< 0.30
IRON (MG FE/KG DRY WT)	1200.	1300.	1100.	2500.
LEAD (MG PB/KG DRY WT)	2.4	2.0	2.2	3.0
MANGANESE (MG MN/KG DRY WT)	340.	510.	270.	270.
MERCURY (MG HG/KG DRY WT)	0.009	0.015	0.004	<0.001
NICKEL (MG NI/KG DRY WT)	5.4	5.3	9.0	9.6
ZINC (MG ZN/KG DRY WT)	2.6	5.8	3.7	6.1
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 5-A 2/10/81	STATION 5-B 2/10/81	STATION 6-A 2/15/81	STATION 6-B 2/15/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	--	86.0	--	28.0
BED MTL (% FINER THAN 1.0 MM)	--	68.0	--	18.0
BED MTL (% FINER THAN 0.5 MM)	--	34.0	--	6.9
BED MTL (% FINER THAN 0.25 MM)	--	13.0	--	1.6
BED MTL (% FINER THAN 0.10 MM)	--	4.7	--	0.5
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	--	2.7	--	0.3
BED MTL (% FINER THAN 0.002 MM)	--	0.5	--	0.1
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	< 0.30	0.65	0.48	0.40
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	< --	0.12	--	0.07
NITROGEN, TOTAL KJELDAHL (MG N/KG)	78.	63.	49.	31.
OIL & GREASE (%TOTAL DRY WT)	0.4	0.2	0.2	0.2
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	34.	31.	36.	42.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	< 0.3	< 0.3	< 0.3	< 0.3
CADMIUM (MG CD/KG DRY WT)	0.47	0.19	0.16	0.21
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	< 3.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	< 0.30	< 0.30
IRON (MG FE/KG DRY WT)	960.	1100.	1900.	910.
LEAD (MG PB/KG DRY WT)	1.6	1.8	1.4	0.9
MANGANESE (MG MN/KG DRY WT)	180.	180.	470.	220.
MERCURY (MG HG/KG DRY WT)	0.003	0.007	<0.001	0.021
NICKEL (MG NI/KG DRY WT)	6.8	7.7	4.5	< 4.0
ZINC (MG ZN/KG DRY WT)	1.4	1.2	3.8	1.4
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

Table D-1 (Continued, Page 4 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 2/12/81	STATION 7-B 2/12/81	STATION 8-A 2/14/81	STATION 8-B 2/14/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	--	84.0	--	50.0
BED MTL (% FINER THAN 1.0 MM)	--	70.0	--	43.0
BED MTL (% FINER THAN 0.5 MM)	--	44.0	--	28.0
BED MTL (% FINER THAN 0.25 MM)	--	18.0	--	7.6
BED MTL (% FINER THAN 0.10 MM)	--	3.2	--	1.3
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	--	2.0	--	0.9
BED MTL (% FINER THAN 0.002 MM)	--	0.5	--	0.2
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.48	0.50	1.70	0.69
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	--	0.09	--	0.10
NITROGEN, TOTAL KJELDAHL (MG N/KG)	45.	49.	81.	43.
OIL & GREASE (%TOTAL DRY WT)	0.2	0.2	0.2	0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	41.	39.	160.	27.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	< 0.3	0.3	< 0.3	< 0.3
CADMIUM (MG CD/KG DRY WT)	0.30	0.27	0.75	0.14
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	< 3.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	0.68	< 0.30
IRON (MG FE/KG DRY WT)	710.	610.	1800.	1200.
LEAD (MG PB/KG DRY WT)	2.2	1.4	4.5	2.7
MANGANESE (MG MN/KG DRY WT)	110.	69.	280.	< 25.
MERCURY (MG HG/KG DRY WT)	0.003	<0.001	0.004	0.005
NICKEL (MG NI/KG DRY WT)	6.0	< 4.0	8.5	< 4.0
ZINC (MG ZN/KG DRY WT)	1.9	1.4	6.0	4.6
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

Table D-1 (Continued, Page 5 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 2/13/81	STATION 9-B 2/13/81	STATION 10-A 2/14/81	STATION 10-B 2/13/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	--	58.0	--	72.0
BED MTL (% FINER THAN 1.0 MM)	--	39.0	--	61.0
BED MTL (% FINER THAN 0.5 MM)	--	21.0	--	25.0
BED MTL (% FINER THAN 0.25 MM)	--	6.6	--	12.0
BED MTL (% FINER THAN 0.10 MM)	--	1.4	--	3.2
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	--	1.0	--	2.2
BED MTL (% FINER THAN 0.002 MM)	--	0.2	--	0.6
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.79	1.30	1.30	0.73
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	--	0.18	--	0.11
NITROGEN, TOTAL KJELDAHL (MG N/KG)	69.	67.	26.	67.
OIL & GREASE (%TOTAL DRY WT)	0.3	0.2	0.3	0.3
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	140.	71.	41.	39.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	< 0.3	< 0.3	< 0.3	< 0.3
CADMIUM (MG CD/KG DRY WT)	0.36	0.36	0.36	0.44
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	7.3
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	0.41	< 0.30
IRON (MG FE/KG DRY WT)	1200.	1200.	3400.	2700.
LEAD (MG PB/KG DRY WT)	3.2	2.9	1.1	3.6
MANGANESE (MG MN/KG DRY WT)	94.	69.	210.	240.
MERCURY (MG HG/KG DRY WT)	0.008	0.004	0.013	<0.001
NICKEL (MG NI/KG DRY WT)	9.5	< 4.0	6.2	6.7
ZINC (MG ZN/KG DRY WT)	3.8	2.3	3.4	5.6
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-ARCCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-ARCCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-ARCCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

Table D-1 (Continued, Page 6 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 11-A 2/13/81	STATION 11-B 2/13/81
MECHANICAL DATA		
SIEVE ANALYSIS		
BED MTL (% FINER THAN 2.0 MM)	91.0	--
BED MTL (% FINER THAN 1.0 MM)	81.0	--
BED MTL (% FINER THAN 0.5 MM)	53.0	--
BED MTL (% FINER THAN 0.25 MM)	27.0	--
BED MTL (% FINER THAN 0.10 MM)	13.0	--
HYDROMETER ANALYSIS		
BED MTL (% FINER THAN 0.05 MM)	9.2	--
BED MTL (% FINER THAN 0.002 MM)	1.5	--
PHYSICAL & CHEMICAL DATA		
PHYSICAL DATA		
VOLATILE SOLIDS (% TOTAL DRY WT)	1.40	2.20
MISCELLANEOUS CHEMICAL DATA		
CARBON, ORGANIC (% TOTAL DRY WT)	0.13	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	100.	92.
OIL & GREASE (%TOTAL DRY WT)	0.4	0.2
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	190.	56.
HEAVY METALS		
ARSENIC (MG AS/KG DRY WT)	< 0.3	< 0.3
CADMIUM (MG CD/KG DRY WT)	0.68	0.31
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0
COPPER (MG CU/KG DRY WT)	4.00	9.30
IRON (MG FE/KG DRY WT)	1900.	8300.
LEAD (MG PB/KG DRY WT)	3.1	6.6
MANGANESE (MG MN/KG DRY WT)	200.	470.
MERCURY (MG HG/KG DRY WT)	<0.001	0.028
NICKEL (MG NI/KG DRY WT)	6.0	12.0
ZINC (MG ZN/KG DRY WT)	1.9	1.6
CHLORINATED HYDROCARBON PESTICIDES		
ALDRIN (UG/KG DRY WT)	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--
PCB-ARCCLOR 1242 (UG/KG DRY WT)	< 25.	--
PCB-ARCCLOR 1254 (UG/KG DRY WT)	< 25.	--
PCB-ARCCLOR 1260 (UG/KG DRY WT)	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--

Table D-2

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 1-A 7/14/81	STATION 1-B 7/14/81	STATION 2-A 7/14/81	STATION 2-B 7/14/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	95.0	--	98.0	--
BED MTL (% FINER THAN 1.0 MM)	85.0	--	86.0	--
BED MTL (% FINER THAN 0.5 MM)	35.0	--	27.0	--
BED MTL (% FINER THAN 0.25 MM)	3.4	--	3.4	--
BED MTL (% FINER THAN 0.10 MM)	1.5	--	1.7	--
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	0.8	--	1.2	--
BED MTL (% FINER THAN 0.032 MM)	0.5	--	0.4	--
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.36	0.50	0.27	0.34
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	0.07	--	< 0.05	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	< 20.	29.	27.	< 20.
OIL & GREASE (%TOTAL DRY WT)	0.1	< 0.1	< 0.1	< 0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	36.	45.	46.	31.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	< 0.3	0.9	0.4	0.5
CADMIUM (MG CD/KG DRY WT)	0.53	0.09	0.16	0.14
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	< 3.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	< 0.30	< 0.30
IRON (MG FE/KG DRY WT)	2900.	2500.	1800.	1900.
LEAD (MG PB/KG DRY WT)	1.8	1.5	2.5	2.3
MANGANESE (MG MN/KG DRY WT)	160.	210.	460.	480.
MERCURY (MG HG/KG DRY WT)	0.013	<0.013	0.052	<0.013
NICKEL (MG NI/KG DRY WT)	< 4.0	< 4.0	< 4.0	< 4.0
ZINC (MG ZN/KG DRY WT)	19.0	2.1	4.4	3.5
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

Table D-2 (Continued, Page 2 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 3-A 7/13/81	STATION 3-B 7/13/81	STATION 4-A 7/13/81	STATION 4-B 7/13/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	81.0	--	45.0	--
BED MTL (% FINER THAN 1.0 MM)	62.0	--	39.0	--
BED MTL (% FINER THAN 0.5 MM)	25.0	--	30.0	--
BED MTL (% FINER THAN 0.25 MM)	4.4	--	17.0	--
BED MTL (% FINER THAN 0.10 MM)	1.6	--	3.5	--
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	1.1	--	2.1	--
BED MTL (% FINER THAN 0.002 MM)	0.7	--	0.7	--
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.42	0.48	0.71	0.82
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	0.07	--	0.14	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	44.	47.	72.	76.
OIL & GREASE (%TOTAL DRY WT)	< 0.1	< 0.1	< 0.1	< 0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	41.	42.	190.	180.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	0.8	0.9	0.7	1.0
CADMIUM (MG CD/KG DRY WT)	0.11	0.14	0.13	0.13
CHROMIUM (MG CR/KG DRY WT)	< 3.0	3.1	< 3.0	18.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	< 0.30	0.54
IRON (MG FE/KG DRY WT)	3000.	4900.	5400.	18000.
LEAD (MG PB/KG DRY WT)	2.6	2.7	5.2	1.1
MANGANESE (MG MN/KG DRY WT)	640.	790.	240.	410.
MERCURY (MG HG/KG DRY WT)	<0.013	<0.013	0.012	0.050
NICKEL (MG NI/KG DRY WT)	< 4.0	< 4.0	< 4.0	21.0
ZINC (MG ZN/KG DRY WT)	4.5	6.8	9.8	13.0
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

Table D-2 (Continued, Page 3 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 5-A 7/13/81	STATION 5-B 7/13/81	STATION 6-A 7/15/81	STATION 6-B 7/15/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	75.0	--	51.0	--
BED MTL (% FINER THAN 1.0 MM)	51.0	--	32.0	--
BED MTL (% FINER THAN 0.5 MM)	30.0	--	12.0	--
BED MTL (% FINER THAN 0.25 MM)	8.7	--	2.7	--
BED MTL (% FINER THAN 0.10 MM)	1.9	--	1.1	--
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	1.2	--	0.8	--
BED MTL (% FINER THAN 0.002 MM)	0.2	--	0.2	--
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.83	0.59	0.47	0.62
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	0.13	--	0.11	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	62.	58.	57.	38.
OIL & GREASE (%TOTAL DRY WT)	< 0.1	< 0.1	< 0.1	< 0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	32.	47.	60.	37.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	0.7	1.2	1.2	1.0
CADMIUM (MG CD/KG DRY WT)	0.13	0.09	0.14	0.28
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	7.6
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	0.31	< 0.30
IRON (MG FE/KG DRY WT)	4800.	3500.	8500.	9600.
LEAD (MG PB/KG DRY WT)	4.5	2.0	5.8	4.8
MANGANESE (MG MN/KG DRY WT)	280.	200.	490.	870.
MERCURY (MG HG/KG DRY WT)	<0.013	<0.013	<0.013	0.012
NICKEL (MG NI/KG DRY WT)	< 4.0	< 4.0	< 4.0	< 4.0
ZINC (MG ZN/KG DRY WT)	6.5	6.4	7.0	7.5
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

Table C-2 (Continued, Page 4 of 6)

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 7-A 7/13/81	STATION 7-B 7/13/81	STATION 8-A 7/14/81	STATION 8-B 7/14/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	66.0	--	56.0	--
BED MTL (% FINER THAN 1.0 MM)	52.0	--	49.0	--
BED MTL (% FINER THAN 0.5 MM)	32.0	--	33.0	--
BED MTL (% FINER THAN 0.25 MM)	14.0	--	7.9	--
BED MTL (% FINER THAN 0.10 MM)	3.1	--	1.3	--
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	2.0	--	1.0	--
BED MTL (% FINER THAN 0.002 MM)	0.6	--	0.3	--
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.31	0.43	1.10	0.70
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	0.15	--	0.13	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	35.	43.	75.	79.
OIL & GREASE (%TOTAL DRY WT)	0.1	< 0.1	< 0.1	< 0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	45.	44.	69.	65.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	0.4	1.1	1.7	0.7
CADMIUM (MG CD/KG DRY WT)	0.17	0.05	0.47	0.29
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	31.0	< 3.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	< 0.30	0.57
IRON (MG FE/KG DRY WT)	5100.	3800.	17000.	11000.
LEAD (MG PB/KG DRY WT)	3.4	2.6	9.8	5.1
MANGANESE (MG MN/KG DRY WT)	200.	170.	990.	1400.
MERCURY (MG HG/KG DRY WT)	<0.013	<0.013	<0.013	<0.013
NICKEL (MG NI/KG DRY WT)	6.1	< 4.0	< 4.0	< 4.0
ZINC (MG ZN/KG DRY WT)	10.0	1.4	15.0	22.0
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 9-A 7/13/81	STATION 9-B 7/13/81	STATION 10-A 7/14/81	STATION 10-B 7/14/81
MECHANICAL DATA				
SIEVE ANALYSIS				
BED MTL (% FINER THAN 2.0 MM)	80.0	--	63.0	--
BED MTL (% FINER THAN 1.0 MM)	67.0	--	48.0	--
BED MTL (% FINER THAN 0.5 MM)	36.0	--	30.0	--
BED MTL (% FINER THAN 0.25 MM)	9.8	--	7.3	--
BED MTL (% FINER THAN 0.10 MM)	3.8	--	2.1	--
HYDROMETER ANALYSIS				
BED MTL (% FINER THAN 0.05 MM)	3.2	--	1.5	--
BED MTL (% FINER THAN 0.002 MM)	0.5	--	0.4	--
PHYSICAL & CHEMICAL DATA				
PHYSICAL DATA				
VOLATILE SOLIDS (% TOTAL DRY WT)	0.81	0.63	0.76	5.20
MISCELLANEOUS CHEMICAL DATA				
CARBON, ORGANIC (% TOTAL DRY WT)	0.15	--	0.11	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	94.	97.	25.	23.
OIL & GREASE (%TOTAL DRY WT)	< 0.1	< 0.1	< 0.1	< 0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	160.	110.	71.	72.
HEAVY METALS				
ARSENIC (MG AS/KG DRY WT)	0.9	0.3	0.9	0.5
CADMIUM (MG CD/KG DRY WT)	0.37	0.10	0.25	0.11
CHROMIUM (MG CR/KG DRY WT)	< 3.0	< 3.0	< 3.0	< 3.0
COPPER (MG CU/KG DRY WT)	< 0.30	< 0.30	0.30	0.41
IRON (MG FE/KG DRY WT)	2700.	7200.	12000.	9000.
LEAD (MG PB/KG DRY WT)	3.3	5.4	7.7	5.8
MANGANESE (MG MN/KG DRY WT)	150.	180.	370.	230.
MERCURY (MG HG/KG DRY WT)	<0.013	<0.013	<0.013	<0.013
NICKEL (MG NI/KG DRY WT)	< 4.0	< 4.0	4.7	< 4.0
ZINC (MG ZN/KG DRY WT)	6.5	5.3	27.0	19.0
CHLORINATED HYDROCARBON PESTICIDES				
ALDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--	< 25.	--

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
SEDIMENT DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

SEDIMENT SAMPLING RESULTS

PARAMETER NAME (UNITS)	STATION 11-A 7/14/81	STATION 11-B 7/14/81
MECHANICAL DATA		
SIEVE ANALYSIS		
BED MTL (% FINER THAN 2.0 MM)	100.0	--
BED MTL (% FINER THAN 1.0 MM)	90.0	--
BED MTL (% FINER THAN 0.5 MM)	73.0	--
BED MTL (% FINER THAN 0.25 MM)	60.0	--
BED MTL (% FINER THAN 0.10 MM)	53.0	--
HYDROMETER ANALYSIS		
BED MTL (% FINER THAN 0.05 MM)	48.0	--
BED MTL (% FINER THAN 0.002 MM)	7.7	--
PHYSICAL & CHEMICAL DATA		
PHYSICAL DATA		
VOLATILE SOLIDS (% TOTAL DRY WT)	2.60	7.20
MISCELLANEOUS CHEMICAL DATA		
CARBON, ORGANIC (% TOTAL DRY WT)	0.12	--
NITROGEN, TOTAL KJELDAHL (MG N/KG)	130.	260.
OIL & GREASE (%TOTAL DRY WT)	< 0.1	< 0.1
PHOSPHORUS, TOTAL (MG P/KG DRY WT)	320.	410.
HEAVY METALS		
ARSENIC (MG AS/KG DRY WT)	0.8	0.9
CADMIUM (MG CD/KG DRY WT)	0.19	0.18
CHROMIUM (MG CR/KG DRY WT)	3.2	5.1
COPPER (MG CU/KG DRY WT)	2.70	2.50
IRON (MG FE/KG DRY WT)	25000.	36000.
LEAD (MG PB/KG DRY WT)	7.6	10.0
MANGANESE (MG MN/KG DRY WT)	430.	430.
MERCURY (MG HG/KG DRY WT)	0.027	0.097
NICKEL (MG NI/KG DRY WT)	11.0	15.0
ZINC (MG ZN/KG DRY WT)	44.0	63.0
CHLORINATED HYDROCARBON PESTICIDES		
ALDRIN (UG/KG DRY WT)	< 1.0	--
BHC-ALPHA ISOMER (UG/KG DRY WT)	< 1.0	--
BHC-BETA ISOMER (UG/KG DRY WT)	< 1.0	--
BHC-GAMMA ISOMER (UG/KG DRY WT)	< 1.0	--
CHLORDANE (UG/KG DRY WT)	< 1.0	--
O,P' DDD (UG/KG DRY WT)	< 1.0	--
P,P' DDD (UG/KG DRY WT)	< 1.0	--
O,P' DDE (UG/KG DRY WT)	< 1.0	--
P,P' DDE (UG/KG DRY WT)	< 1.0	--
O,P' DDT (UG/KG DRY WT)	< 1.0	--
P,P' DDT (UG/KG DRY WT)	< 1.0	--
DIELDRIN (UG/KG DRY WT)	< 1.0	--
ENDRIN (UG/KG DRY WT)	< 1.0	--
HEPTACHLOR (UG/KG DRY WT)	< 1.0	--
MIREX (UG/KG DRY WT)	< 10.	--
PCB-AROCLOR 1242 (UG/KG DRY WT)	< 25.	--
PCB-AROCLOR 1254 (UG/KG DRY WT)	< 25.	--
PCB-AROCLOR 1260 (UG/KG DRY WT)	< 25.	--
TOXAPHENE (UG/KG DRY WT)	< 25.	--

APPENDIX E

PERIPHYTON DATA

LIST OF APPENDIX E TABLES

Table E-1

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

PERIPHYTON - SAVANNAH RIVER - SAMPLES PLACED 1/13-14/81 RETRIEVED 2/9-13/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO/50 CM):										
STA LOC:	1	2	3	4	5	6	7	8	9	10	11
HORIZ LOC:	10	50	60	20	50	98	67	5	75	95	50
VERT LOC:	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF
CYANOPHYTA											
LYNGBYA SP	-	3423	-	-	-	-	4202	763	-	58	-
MERISMOPEDIA TENUISSIMA	3735	-	-	-	-	-	-	-	-	-	124
OSCILLATORIA SP	14006	5913	848	2698	376	137	32680	1712	-	54	-
POLYCYSTIS AERUGINOSA	-	-	-	2490	-	-	-	-	-	-	-
CHLOROPHYTA											
ANKISTRODESMUS FALCATUS	233	156	109	-	-	-	233	-	-	-	-
ANKISTRODESMUS SPIRALIS	-	-	23	-	-	-	-	-	-	-	-
ARTHRODESMUS INCUS V EXTENSSUS	-	-	-	-	13	-	-	-	-	-	-
CHLAMYDOMONAS SP	233	104	31	-	-	8	3968	-	-	4	-
CHLOROCOCCUM HUMICOLA	-	-	-	-	-	-	-	23	-	-	-
CLOSTERIUM SP	-	-	-	104	-	-	233	-	-	-	-
KIRCHNERIELLA LUNARIS	-	-	8	-	13	-	-	-	-	-	-
KIRCHNERIELLA OBESA	-	-	-	-	-	-	-	-	-	-	4
OOCYSTIS SP	-	-	-	-	-	-	1634	-	-	-	-
SCENEDESMUS ARMATUS	-	-	31	-	-	-	-	-	-	-	-
SCENEDESMUS BIJUGA	467	-	-	207	-	2	-	-	-	19	-
STAURASTRUM HIRSUTUM	-	-	-	-	39	-	1167	-	-	-	-
STIGEOCLONIUM SP	14472	-	-	-	-	66	1867	1159	700	-	47
ULOTHRIX SP	-	934	-	-	-	-	-	-	-	-	-
ULOTHRIX TENUISSIMA	16106	-	-	-	-	3	-	-	-	-	-
UNID FILAMENTOUS CHLOROPHYTA	-	3423	-	-	26	-	-	-	-	12	-
UNID FLAGELLATED CHLOROPHYTA	-	-	-	-	-	-	14006	-	-	93	-

Table E-1 (Continued, Page 2 of 3)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO/SQ CM):										
STA LOC:	1	2	3	4	5	6	7	8	9	10	11
HORIZ LOC:	10	50	60	20	59	98	67	5	75	95	50
VERT LOC:	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF
PYRRHOPHYTA											
GLENODONIUM SP	-	52	-	-	-	-	-	-	-	-	-
GYMNODINIUM SP	-	52	-	-	-	-	-	-	-	-	-
BACILLARIOPHYCEAE											
ACHNANTHES LANCEOLATA V DUBIA	-	104	-	-	-	2	-	62	-	4	463
ACHNANTHES MINUTISSIMA	5602	104	16	-	130	-	4202	-	-	-	-
ACHNANTHES SP	-	207	-	-	-	P	-	-	-	4	-
AMPHIPLEURA PELLUCIDA	231	-	-	-	-	-	-	-	-	-	-
ASTERIONELLA FORMOSA	-	363	-	-	-	-	-	-	-	4	-
COCCONEIS PLACENTULA	-	-	-	207	-	-	467	9	-	-	-
COCCONEIS PLACENTULA V EUGLYPTA	-	156	-	104	-	P	-	-	-	-	-
COSCINODISCUS SP	-	52	-	-	-	-	-	-	-	-	-
CYCLOTELLA MENEGHINIANA	-	-	-	-	-	-	-	-	-	-	4
CYCLOTELLA STELLIGERA	-	104	-	-	-	P	-	-	-	4	4
CYMBELLA MINUTA	233	52	16	-	39	-	700	16	-	-	4
CYMBELLA TUMIDA	467	52	23	622	-	-	467	9	-	-	4
EUNOTIA ARCUS	-	52	-	-	-	-	-	-	-	-	-
EUNOTIA CURVATA	233	-	-	-	-	-	-	-	467	4	-
EUNOTIA TENELLA	3501	-	16	-	78	5	457	16	-	739	19
FRUSTULIA VULGARIS	700	-	8	-	-	-	233	-	233	-	-
GOMPHONEMA AFFINE	-	-	-	-	-	-	-	-	233	-	-
GOMPHONEMA ANGUSTATUM	27544	207	2031	2594	207	21	467	912	-	70	319
GOMPHONEMA HELVETICUM V TENUIS	700	-	39	311	-	-	-	-	-	-	93
GOMPHONEMA PARVULUM	11905	779	303	10272	856	6	12138	194	13539	533	97
GOMPHONEMA SUBCLAVATUM	5135	-	-	-	-	13	-	-	-	-	-
GOMPHONEMA TRUNCATUM V CAPITATUM	-	104	-	207	-	-	-	-	-	-	-
GOMPHONEMA SP	-	415	-	-	104	-	-	-	-	12	-
MELOSIRA AMBIGUA	467	104	-	-	-	-	-	31	-	12	-
MELOSIRA DISTANS	-	-	-	-	-	14	-	16	-	-	-
MELOSIRA VARIANS	700	622	-	136128	13	4	700	54	-	-	-
MERIDION CIRCULARE V CONSTRICTUM	-	-	54	-	26	P	-	-	-	-	19
NAVICULA CRYPTOCEPHALA	1634	-	31	4461	-	3	4202	31	56723	-	12
NAVICULA DECUSSIS	-	-	-	311	-	-	467	-	-	P	-
NAVICULA LATENS	-	-	-	-	-	-	-	-	-	-	4

Table E-1 (Continued, Page 3 of 3)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO/SQ CM):										
STA LOC:	1	2	3	4	5	6	7	8	9	10	11
HORIZ LOC:	10	50	60	20	50	98	67	5	75	95	50
VERT LOC:	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF
NAVICULA LATEROPUNCTATA	-	-	-	-	-	-	233	8	-	-	-
NAVICULA PEREGRINA	-	-	-	-	26	-	233	-	-	-	-
NAVICULA RHYNCHOCEPHALA	-	-	-	-	-	-	-	-	56723	-	-
NAVICULA SP	233	52	-	415	-	-	-	-	-	12	-
NITZSCHIA ACICULARIS	2334	1608	47	207	13	2	15873	86	-	16	-
NITZSCHIA AMPHIOXOIDES	-	-	8	104	-	-	-	-	-	-	-
NITZSCHIA CLAUSII	-	-	-	-	-	-	3034	8	-	4	-
NITZSCHIA DISSIPATA	-	-	-	-	-	-	233	-	233	-	-
NITZSCHIA FONTICOLA	934	207	-	-	-	2	3735	-	700	-	-
NITZSCHIA GRACILIS	233	-	-	3320	-	-	18441	-	233	-	-
NITZSCHIA INTERMEDIA V ACTINASTROIDES	-	104	8	-	-	-	-	8	-	31	-
NITZSCHIA MICROCEPHALA	-	104	8	104	-	-	233	-	1167	4	-
NITZSCHIA PALEA	-	-	54	726	-	-	2569	31	7936	-	35
NITZSCHIA SP	-	52	-	207	13	8	934	-	700	-	4
PINNULARIA ABAUJENSIS V SUBUNDULATA	-	-	-	-	-	-	-	8	2101	4	-
PINNULARIA MAIOR	-	-	-	-	-	-	-	-	233	-	-
RHOPALODIA MUSCULUS	-	-	-	-	-	-	-	-	-	-	4
SURIRELLA ANGUSTA	-	-	-	930	-	-	233	-	10504	-	12
SURIRELLA TENUISSIMA	467	52	-	726	-	2	5936	16	1401	-	23
SURIRELLA SP	-	-	-	-	-	-	-	-	-	-	16
SYNEDRA DELICATISSIMA	21008	3008	350	3839	207	2	1634	23	-	27	-
SYNEDRA FILIFORMIS V EXILIS	9237	-	187	-	454	6	1167	257	2334	-	-
SYNEDRA PULCHELLA	21709	3994	16	1245	169	35	467	148	467	39	16
SYNEDRA SOCIA	6535	519	78	7574	376	29	16807	638	2801	-	16
SYNEDRA TENERA	-	-	-	-	-	-	-	-	-	227	-
SYNEDRA ULNA	3968	1089	101	29467	363	4	39916	8	2101	23	8
SYNEDRA SP	-	207	-	-	-	-	-	-	-	-	-
TABELLARIA FLOCCULOSA V FLOCCULOSA	-	156	-	-	-	4	-	-	-	27	-
TOTAL NUMBER OF ORGANISMS	175065	20685	4444	209480	3541	367	196077	5212	161529	2148	1351
NUMBER OF TAXA	31	37	26	27	21	27	37	27	21	28	24

Table E-2

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

PERIPHYTON - SAVANNAH RIVER - SAMPLES PLACED 6/15-16/81 RETRIEVED 7/13-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO/SQ CM):									
STA LOC:	1	2	4	5	6	7	8	9	10	11
HORIZ LOC:	10	20	10	50	05	50	10	40	95	30
VERT LOC:	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF
CYANOPHYTA										
CHROOCOCCUS DISPERSUS	-	-	-	-	-	-	-	-	1037	-
LYNGBYA SP	103748	103748	-	2723	90779	-	93385	21550	33719	-
OSCILLATORIA SP	224355	150434	1297	389	942809	15692	137484	973	1037	519
CHLOROPHYTA										
ANKISTRODESMUS FALCATUS	-	-	-	-	-	-	-	-	-	194
CHARACIUM PRINGSHEIMII	-	-	-	-	1297	-	-	-	-	-
CHLAMYDOMONAS SP	-	-	-	-	-	-	519	-	-	-
CHLORELLA SP	-	3890	-	-	1297	-	-	-	-	65
CHODATELLA QUADRISETA	-	-	-	-	-	-	-	-	-	973
CLOSTERIOPSIS SP	-	-	-	259	-	-	-	-	-	-
CLOSTERIUM MONILIFERUM	-	-	-	43	-	-	-	-	-	-
CLOSTERIUM PARVULUM	-	-	-	86	-	-	-	-	-	-
COSMARIUM SP	-	-	130	259	-	-	-	-	-	-
KIRCHNERIELLA LUNARIS	-	-	-	-	-	-	-	-	130	-
OEDOGONIUM SP	-	-	1167	-	-	-	-	-	-	-
SCENEDESMUS ABUNDANS	-	-	-	-	-	519	-	-	-	-
SCENEDESMUS ACUMINATUS	-	-	-	-	-	-	-	-	-	259
SCENEDESMUS ARMATUS V BICAUDATA	-	-	-	-	-	-	-	-	-	9921
SCENEDESMUS BIJUGA	-	-	-	-	-	-	-	-	-	908
SCENEDESMUS QUADRICAUDA	-	-	-	-	-	519	-	65	-	1621
SPIROGYRA SP	-	-	-	-	-	908	-	-	5936	-
STAURASTRUM SP	-	-	-	43	-	-	-	-	-	-
STIGEOCLONIUM SP	12969	-	-	-	25937	-	5188	-	1945	-
ULOTHRIX SP	-	-	-	-	-	-	6226	-	-	-

NOTE: Periphytometer not recovered at Station 3.

Table E-2 (Continued, Page 2 of 3)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO/SQ CM):									
STA LOC:	1	2	4	5	6	7	8	9	10	11
HORIZ LOC:	10	20	10	50	05	50	10	40	95	30
VERT LOC:	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF
CRYPTOPHYTA										
CHILOMONAS SP	-	-	-	-	-	-	-	-	-	389
BACILLARIOPHYCEAE										
ACHNANTHES LANCEOLATA V DUBIA	-	-	106092	-	-	4798	1556	-	-	130
ACHNANTHES LINEARIS F CURTA	35015	-	-	-	-	-	-	-	-	-
ACHNANTHES MINUTISSIMA	588769	456491	-	2075	191933	519	152270	194	23603	-
COCCONEIS PLACENTULA	1297	1297	259	43	-	1426	10635	-	-	-
CYMBELLA ASPERA	-	-	-	-	-	130	-	-	-	-
CYMBELLA LUNATA	-	-	-	86	-	-	-	-	-	-
CYMBELLA MINUTA	1297	3890	-	1599	2594	648	778	97	259	-
CYMBELLA TUMIDA	1297	-	-	86	-	908	519	32	-	-
CYMBELLA SP	1297	-	-	-	-	-	-	-	-	-
EUNOTIA CURVATA	-	-	-	-	-	-	-	-	259	-
EUNOTIA SERRA	-	-	-	-	-	-	-	97	-	-
EUNOTIA TENELLA	2594	-	-	-	-	-	-	-	-	-
EUNOTIA SP	3890	-	-	173	-	-	-	-	-	-
FRUSTULIA RHOMBOIDES	-	-	-	-	-	130	-	65	-	65
FRUSTULIA VULGARIS	-	-	-	43	-	-	-	-	-	-
GOMPHONEMA ANGUSTATUM	1297	18156	-	-	20750	259	15564	65	648	-
GOMPHONEMA GRACILE	-	-	-	-	-	-	519	-	-	-
GOMPHONEMA PARVULUM	31124	164700	-	692	32421	2205	107912	97	1167	194
GOMPHONEMA SUBCLAVATUM	2594	-	-	-	-	-	-	-	-	-
GYROSIGMA ACUMINATUM	-	-	389	-	-	519	-	-	-	65
MELOSIRA VARIANS	5187	5187	1167	-	-	27493	2075	-	-	-
NAVICULA CRYPTOCEPHALA	1297	-	-	-	1297	130	-	65	-	-
NAVICULA DECUSSIS	1297	-	130	43	-	130	-	32	-	-
NAVICULA MINIMA	-	12968	-	-	1297	-	3113	-	130	-
NAVICULA NOTHA	9078	-	-	951	-	778	778	551	1037	-
NAVICULA SIMULA	-	-	-	-	1297	-	-	194	-	65
NAVICULA TRIPUNCTATA	-	-	-	-	-	1686	-	-	-	-

Table E-2 (Continued, Page 3 of 3)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO/SQ CM):									
STA LOC:	1	2	4	5	6	7	8	9	10	11
HORIZ LOC:	10	20	10	50	05	50	10	40	95	30
VERT LOC:	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF	SURF
NAVICULA SP	-	-	259	43	-	130	-	32	130	-
NITZSCHIA ACICULARIS	-	-	130	86	-	130	-	-	-	-
NITZSCHIA AGNITA	-	-	-	-	-	-	-	-	-	65
NITZSCHIA CLAUSII	-	-	259	-	-	-	-	-	-	-
NITZSCHIA DISSIPATA	-	-	-	-	3890	-	-	-	-	-
NITZSCHIA INTERMEDIA V ACTINASTROIDES	-	-	130	-	2594	-	-	32	-	-
NITZSCHIA MICROCEPHALA	2594	-	-	-	-	-	-	-	-	-
NITZSCHIA PALEA	3890	-	-	43	-	130	-	130	-	-
NITZSCHIA SP	-	-	-	173	-	259	-	130	-	-
PINNULARIA APAUJENSIS V SUBUNDULATA	-	-	389	-	-	-	-	-	-	-
SURIRELLA ANGUSTA	-	-	648	-	-	-	-	-	-	-
SURIRELLA GUATIMALENSIS	-	-	-	-	-	130	-	-	-	-
SURIRELLA TENUISSIMA	1297	-	778	-	-	2723	-	227	-	-
SURIRELLA SP	-	-	-	-	-	259	-	-	-	-
SYNEDRA DELICATISSIMA	-	2594	-	-	-	-	259	-	1297	-
SYNEDRA PULCHELLA	-	-	-	-	1297	-	8301	-	389	-
SYNEDRA RUMPENS	-	-	-	-	-	-	2075	-	259	-
SYNEDRA SOCIA	-	-	-	-	10375	519	1297	-	-	-
SYNEDRA ULNA	7781	1297	-	-	18156	130	6485	-	-	-
TABELLARIA FLOCCULOSA V FLOCCULOSA	-	-	-	-	-	389	-	-	778	-
EUGLENOPHYTA										
EUGLENA SP	-	-	-	-	-	-	-	-	-	194
PHACUS SP	-	-	-	-	-	-	-	-	-	12190
TOTAL NUMBER OF ORGANISMS	1043963	924652	113214	9938	1350020	64196	556938	24638	73659	27817
NUMBER OF TAXA	22	12	15	21	17	29	21	19	18	17

APPENDIX F

MACROINVERTEBRATE DATA

LIST OF APPENDIX F TABLES

Table F-1

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

HESTER-DENDY -SAVANNAH RIVER- SAMPLES PLACED 1/13-14/81 COLLECTED 2/9-13/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC:	1	2	3	4	5	7	8	9	10	11
HORIZ LOC:	10	50	60	20	50	67	5	75	95	50
VERT LOC:	LT 1M	LT 1M	LT 1M	LT 1M	LT 1M	LT 1M	LT 1M	LT 1M	LT 1M	LT 1M
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
NAIS ELINGUIS	40	24	-	331	-	8	-	-	-	-
NAIS VARIABILIS	-	-	-	-	-	175	-	335	-	-
STYLARIA LACUSTRIS	32	8	-	-	-	-	-	-	-	-
UNIDENTIFIED NAIDIDAE	-	-	-	-	-	8	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
TUBIFICIDAE, IMMATURE	-	-	-	-	-	-	-	-	-	8
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
BRILLIA PAR	-	-	-	16	6	-	-	24	-	-
CONCHAPELOPIA SP	-	-	8	-	-	-	-	-	-	79
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	6	-	-
CORYNONEURA TARIS	6	-	-	595	-	79	-	-	-	-
CRICOTOPUS-ORTHOCLADIUS	778	429	540	1222	46	132	266	1032	87	-
EUKIEFFERIELLA CLARIPENNIS GROUP	-	-	-	8	-	24	16	-	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	-	-	-	-	8	-	-	-	-
NANOCLADIUS SPINIPLENUS	-	-	-	8	-	-	-	6	-	-
NEAR PARATENDIPES	-	-	-	-	-	-	-	-	-	6
POLYPEDILUM CONVICTUM	-	-	-	-	-	8	-	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	-	6	-	-
RHEOCRICOTOPUS ROBACKI	-	-	-	8	-	-	-	-	-	-

NOTE: No organisms found on Hester Dendy at Station 6.

Table F-1 (Continued, Page 2 of 5)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO/50 M):									
STA LOC:	1	2	3	4	5	7	8	9	10	11
HORIZ LOC:	10	50	60	20	50	67	5	75	95	50
VERT LOC:	LT IM	LT IM	LT IM	LT IM	LT IM	LT IM	LT IM	LT IM	LT IM	LT IM
RHEOTANYTARSUS EXIGUUS GROUP	-	-	103	16	8	-	-	80	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	-	-	8	-	-	-	-
THIENEMANNIELLA XENA	-	-	-	79	-	79	-	8	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
EPHEMERELLA (SERRATELLA) SP	8	-	40	71	603	8	-	127	-	-
STENONEMA SMITHAE	-	-	32	-	32	-	-	8	-	16
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	8	-	8	-	-	-	-	-
HYDROPTILA SP	-	-	-	40	-	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	-	-	-	-	8
DIPLOPERLA-ISOPERLA	-	-	-	-	8	8	-	16	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	8	8	-	-	-	-	-	-
MACRONYCHUS GLABRATUS	-	8	-	-	-	-	-	-	-	-
NEMOCAPNIA SP	8	87	-	8	-	-	-	-	-	-
NEMOURA SP	-	-	-	-	135	8	-	8	-	-
SIMULIUM SP	-	-	8	-	-	8	8	-	-	-
STENELMIS SP	-	8	-	-	8	-	-	-	-	-
MISCELLANEOUS INVERTEBRATES										
ACARI	-	-	-	-	-	-	-	16	-	-
NEMATA	-	-	-	-	-	-	-	8	-	-
TOTAL NUMBER OF ORGANISMS	874	564	747	2460	658	611	310	1620	55	115
NUMBER OF TAXA	6	6	8	13	9	14	3	14	2	5

Table F-1 (Continued, Page 3 of 5)

SHANNON - WEAVER SPECIES DIVERSITY INDEX

HESTER DENDY -SAVANNAH RIVER- SAMPLES PLACED 1/13-14/81 COLLECTED 2/9-13/81

STATION	MAGNITUDE
1	0.714
2	1.171
3	1.434
4	2.046
5	1.502
7	2.721
8	0.464
9	1.777
10	0.417
11	1.567

Table F-1. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Hester-Dendy Macroinvertebrate Biomass—Samplers Placed 1/13-14/81 Collected 2/9-13/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 4 of 5)

Taxa	Stations*									
	1	2	3	4	5	7	8	9	10	11
Annelida-Oligochaeta:										
Nais elinguis	0.0064	0.0038	-	0.0610	-	0.0013	-	-	-	-
Nais variabilis	-	-	-	-	-	0.0040	-	0.0071	-	-
Stylaria lacustris	0.0007	0.0001	-	-	-	-	-	-	-	-
Unidentified Naididae	-	-	-	-	-	0.0001	-	-	-	-
Immature Tubificidae	-	-	-	-	-	-	-	-	-	0.0106
Arthropoda-Insecta-Chironomidae:										
Brillia par	-	-	-	0.0055	0.0004	-	-	0.0059	-	-
Conchapelopia sp.	-	-	0.0066	-	-	-	-	-	-	0.0656
Corynoneura celeripes	-	-	-	-	-	-	-	0.0001	-	-
Corynoneura taris	0.0004	-	-	0.0262	-	0.0035	-	-	-	-
Cricotopus-Orthocladius	0.2645	0.1459	0.1836	0.4155	0.0163	0.0619	0.0972	0.3509	0.0296	-
Eukiefferiella claripennis group	-	-	-	0.0011	-	0.0098	0.0012	-	-	-
Eukiefferiella discoloripes group	-	-	-	-	-	0.0002	-	-	-	-
Nanocladius spiniplenus	-	-	-	0.0004	-	-	-	0.0001	-	-
Near Paratendipes	-	-	-	-	-	-	-	-	-	0.0011
Polypedilum convictum	-	-	-	-	-	0.0011	-	-	-	-
Potthastia longimanus	-	-	-	-	-	-	-	0.0022	-	-
Rheocricotopus robacki	-	-	-	0.0004	-	-	-	-	-	-
Rheotanytarsus exiguus group	-	-	0.0103	0.0016	0.0008	-	-	0.0040	0.0008	-
Tanytarsus guerlus group	-	-	-	-	-	0.0004	-	-	-	-
Thienemanniella xena	-	-	-	0.0221	-	0.0221	-	0.0022	-	-

* No organisms found on sampler from Station 6.

Table F-1. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Hester-Dendy Macroinvertebrate Biomass—Samplers Placed 1/13-14/81 Collected 2/9-13/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 5 of 5)

Taxa	Stations*									
	1	2	3	4	5	7	8	9	10	11
Arthropoda-Insecta-Plecoptera:										
Diploperla-Isoperla	–	–	–	–	0.0022	0.0022	–	0.0043	–	–
Nemocapnia sp.	0.0092	0.0997	–	0.0092	–	–	–	–	–	–
Nemoura sp.	–	–	–	–	0.1953	0.0116	–	0.0116	–	–
Arthropoda-Insecta-Ephemeroptera:										
Ephemerella (Serratella) sp.	0.0092	–	0.0459	0.0815	0.6922	0.0092	–	0.1458	–	–
Stenonema smithae	–	–	0.2333	–	0.2333	–	–	0.0583	–	0.1166
Arthropoda-Insecta-Trichoptera:										
Cheumatopsyche sp.	–	–	0.0010	–	0.0010	–	–	–	–	–
Hydroptila sp.	–	–	–	0.0192	–	–	–	–	–	–
Arthropoda-Insecta-Miscellaneous Diptera:										
Empididae	–	–	0.0008	0.0008	–	–	–	–	–	–
Antocha sp.	–	–	–	–	–	–	–	–	–	0.0132
Simulium sp.	–	–	0.0176	–	–	0.0176	0.0176	–	–	–
Arthropoda-Insecta-Coleoptera:										
Macronychus glabratus	–	0.0026	–	–	–	–	–	–	–	–
Stenelmis sp.	–	0.0839	–	–	0.0839	–	–	–	–	–
Miscellaneous Invertebrates										
Acari	–	–	–	–	–	–	–	0.0014	–	–
Nemata	–	–	–	–	–	–	–	0.0016	–	–
TOTAL BIOMASS	0.2904	0.3360	0.4991	0.6445	1.2259	0.1360	0.1160	0.5955	0.0304	0.2071

* No organisms found on sampler from Station 6.
* Source: WAR, 1981

Table F-2

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

HESTER-DENDY DATA - SAVANNAH RIVER - PLACED 6/15-16/81 COLLECTED 7/13-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	1	2	4	5	6	7	8	9	10	11
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
NAIS BEHNINGI	-	-	8	8	31	-	-	131	-	-
NAIS COMMUNIS	61	8	-	-	446	8	8	23	31	15
NAIS ELINGUIS	554	54	85	-	246	-	15	-	-	-
NAIS PSEUDOBTUSA	738	69	85	8	339	-	23	8	15	-
NAIS VARIABILIS	-	-	-	-	15	-	-	-	15	-
NAIS SP	-	-	-	-	-	-	8	-	-	-
OPHIDONAIS SERPENTINA	31	-	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	-	-	-	-	-	-	-	8	-	-
STYLARIA FOSSULARIS	-	-	-	-	31	-	-	-	-	-
STYLARIA LACUSTRIS	-	61	-	-	77	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
LIMNODRILUS HOFFMEISTERI	31	-	-	-	-	15	-	15	-	1169
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
LUMBRICULIDAE	-	-	-	8	46	-	-	-	-	-
LUMBRICILLUS SP	-	-	-	-	-	-	-	-	8	-
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS GASTROPODA										
LAEVIPEX SP	-	-	23	-	-	15	-	31	-	-
PHYSA SP	-	8	-	-	-	-	-	-	-	-

NOTE: Hester-Dendy not recovered at Station 3.

Table F-2 (Continued, Page 2 of 9)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M): 1	2	4	5	6	7	8	9	10	11
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
HYALELLA AZTECA	61	-	-	-	108	-	-	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
ABLABESMYIA AMERICANA	-	-	8	-	-	-	-	-	-	-
ABLABESMYIA MALLOCHI	-	-	38	-	-	54	-	-	-	-
ABLABESMYIA ORNATA	-	-	-	-	-	8	-	-	-	-
ABLABESMYIA PARAJANTA	-	-	-	-	-	8	-	-	-	-
ABLABESMYIA RHAMPHE	-	-	-	-	-	8	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	15	-	15	-	308
CLADOTANYTARSUS SP	-	-	-	-	-	-	-	15	-	-
CONCHAPELOPIA SP	-	-	-	8	-	-	-	15	-	246
CRICOTOPUS BICINCTUS	231	15	-	-	-	-	-	-	-	-
CRICOTOPUS SP	431	731	23	38	623	38	1008	77	200	-
CRYPTOCHIRONOMUS FULVUS	-	-	-	-	-	8	-	-	-	-
DICROTENDIPES MODESTUS	-	15	-	-	-	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	31	-	77	-	-	69	-	-	-	-
DICROTENDIPES NERVOSUS	-	-	-	-	-	8	-	-	-	-
DICROTENDIPES SP	-	-	-	-	-	-	-	15	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	15	-	-	-	-	-	-	-	-
LABRUNDINIA VIRESCENS	-	-	8	-	-	-	-	-	-	-
NILOTHAUMA BABIYI	-	-	-	8	8	-	-	-	-	-
PARACHIRONOMUS FREQUENS	15	-	23	-	-	-	-	-	-	-
PARATENDIPES SUBAEQUALIS	-	-	-	-	-	-	-	-	-	77
PARATENDIPES SP	-	-	-	-	8	-	-	-	-	-
POLYPEDILUM CONVICTUM	-	123	-	-	-	-	-	-	8	15
POLYPEDILUM FALLAX GROUP	46	-	-	-	-	8	-	8	-	200
POLYPEDILUM HALTERALE	15	-	109	-	-	-	-	-	-	46
POLYPEDILUM ILLINOENSE	-	-	-	-	8	9	-	-	-	92
POLYPEDILUM SCALAENUM	-	-	-	-	-	-	-	-	-	31
POTTHASTIA LONGIMANUS	-	15	-	-	15	-	-	-	-	-
PSEUDOCHIRONOMUS SP	-	-	-	-	8	8	-	-	-	-
RHEOCRICOTOPUS SP	15	139	-	23	-	23	-	200	46	15
RHEOTANYTARSUS EXIGUUS GROUP	46	231	31	46	-	8	-	646	46	-

Table F-2 (Continued, Page 3 of 9)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 1	2	4	5	6	7	8	9	10	11
TANYTARSUS GUERLUS GROUP	31	15	38	23	8	223	-	31	31	154
THIENEMANNIELLA XENA	-	-	-	-	8	-	-	-	-	-
TRIBELOS FUSCICORNIS	46	15	54	-	-	31	-	-	-	31
TRIBELOS JUCUNDUS	-	-	-	-	-	38	-	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
BAETIS SP	-	-	-	15	-	-	8	15	-	-
CAENIS SP	-	-	8	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	38	8	-	-	-	-	-	-	-
HEPTAGENIIDAE	8	-	-	-	-	-	-	-	-	-
ISONYCHIA SP	-	-	-	54	-	-	-	-	-	-
PSEUDOCLOEON SP	-	31	-	-	-	-	-	-	-	-
STENONEMA SP	-	31	23	38	-	8	-	592	-	15
TRICORYTHODES SP	-	-	23	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	108	8	31	-	-	8	400	-	-
HYDROPSYCHE SP	-	554	-	8	-	-	15	54	-	-
HYDROPTILA SP	23	54	-	-	-	-	8	-	-	-
OECETIS SP	-	-	8	-	-	31	-	-	-	-
POLYCENTROPUS SP	-	-	-	-	-	8	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ACRONEURIA SP	-	-	8	46	-	-	-	-	-	-
ANCYRONYX SP	-	-	-	-	-	-	-	8	-	-
ANTOCHA SP	-	15	-	-	-	-	-	-	-	-
CERATOPOGONIDAE (NO LARVAL KEY)	-	-	-	-	-	8	-	-	-	-
CORYDALUS CORNUTUS	-	-	-	23	-	-	-	46	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	8	-	-	-	-	-	-
EPHYDRIDAE	-	-	-	-	-	-	-	8	-	-
LANTHUS SP	-	-	-	8	-	-	-	-	-	-
MACRONYCHUS SP	-	-	-	-	-	-	-	131	-	-
PARAGNETINA SP	-	-	-	8	-	-	-	-	-	-
PERLESTA SP	8	-	-	-	-	-	-	-	-	-
SIMULIUM SP	-	8	-	-	-	-	8	-	-	-

Table F-2 (Continued, Page 4 of 9)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 1	2	4	5	6	7	8	9	10	11
MISCELLANEOUS INVERTEBRATES										
HYDRACARINA SP	-	8	-	-	-	-	-	15	-	-
NEMATA	8	-	-	8	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	8	-	-	-	-	-
PROSTOMA RUBRUM	-	-	-	-	-	-	-	8	-	-
TOTAL NUMBER OF ORGANISMS	2400	2367	695	417	2032	656	1109	2515	400	2414
NUMBER OF TAXA	20	24	21	20	19	24	10	25	9	14

Table F-2 (Continued, Page 5 of 9)

SHANNON - WEAVER SPECIES DIVERSITY INDEX

HESTER DENDY DATA - SAVANNAH RIVER - PLACED 6/15-16/81 COLLECTED 7/13-15/81

STATION	MAGNITUDE
1	2.983
2	3.234
4	3.862
5	3.951
6	2.839
7	3.611
8	0.717
9	3.215
10	2.371
11	2.563

Table F-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Hester Dendy Macroinvertebrate Biomass—Samplers Placed 6/15-18/81 Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 6 of 9)

Taxonomic Classification	Stations*									
	1	2	4	5	6	7	8	9	10	11
Annelida-Oligochaeta-Naididae										
Nais behningi	-	-	0.0003	0.0003	0.0011	-	-	0.0048	-	-
Nais communis	0.0023	0.0003	-	-	0.0165	0.0003	0.0003	0.0009	0.0011	0.0006
Nais elinguis	0.0205	0.0020	0.0031	-	0.0091	-	0.0006	-	-	-
Nais pseudobtusa	0.0262	0.0026	0.0031	0.0003	0.0125	-	0.0009	0.0003	0.0006	-
Nais variabilis	-	-	-	-	0.0006	-	-	-	0.0006	-
Nais sp.	-	-	-	-	-	-	0.0003	-	-	-
Ophidonais serpentina	0.0012	-	-	-	-	-	-	-	-	-
Pristina osborni	-	-	-	-	-	-	-	0.0003	-	-
Stylaria fossularis	-	-	-	-	0.0011	-	-	-	-	-
Stylaria lacustris	-	0.0023	-	-	0.0003	-	-	-	-	-
Annelida-Oligochaeta-Tubificidae										
Limnodrilus hoffmeisteri	0.0086	-	-	-	-	0.0042	-	0.0042	-	0.3261
Annelida-Oligochaeta-Miscellaneous										
Lumbriculidae	-	-	-	0.1296	0.7453	-	-	-	-	-
(Lumbricillus sp.) Enchytraeidae	-	-	-	-	-	-	-	-	0.0006	-
Mollusca-Gastropoda										
Laevipex sp.	-	-	0.0049	-	-	0.0032	-	0.0067	-	-
Physa sp.	-	0.0443	-	-	-	-	-	-	-	-
Arthropoda-Crustacea										
Hyalella azteca	0.0522	-	-	-	0.0924	-	-	-	-	-

* No data at Station 3 due to disappearance of sampler.

Table F-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Hester Dendy Macroinvertebrate Biomass—Samplers Placed 6/15-18/81 Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 7 of 9)

Taxonomic Classification	Stations*									
	1	2	4	5	6	7	8	9	10	11
Arthropoda-Insecta-Chironomidae										
Ablabesmyia americana	-	-	0.0018	-	-	-	-	-	-	-
Ablabesmyia mallochi	-	-	0.0087	-	-	0.0124	-	-	-	-
Ablabesmyia ornata	-	-	-	-	-	0.0018	-	-	-	-
Ablabesmyia parajanta	-	-	-	-	-	0.0018	-	-	-	-
Ablabesmyia rhamphe	-	-	-	-	-	0.0018	-	-	-	-
Chironomus sp.	-	-	-	-	-	0.0030	-	0.0030	-	0.0616
Cladotanytarsus sp.	-	-	-	-	-	-	-	0.0006	-	-
Conchapelopia sp.	-	-	-	0.0006	-	-	-	0.0011	-	0.0185
Cricotopus bicinctus	0.0225	0.0015	-	-	-	-	-	-	-	-
Cricotopus sp.	0.0420	0.0720	0.0022	0.0037	0.0607	0.0037	0.0983	0.0075	0.0195	-
Cryptochironomus fulvus	-	-	-	-	-	0.0031	-	-	-	-
Dicrotendipes modestus	-	0.0019	-	-	-	-	-	-	-	-
Dicrotendipes neomodestus	0.0039	-	0.0096	-	-	0.0086	-	-	-	-
Dicrotendipes nervosus	-	-	-	-	-	0.0010	-	-	-	-
Dicrotendipes sp.	-	-	-	-	-	-	-	0.0019	-	-
Eukiefferiella discoloripes group	-	0.0033	-	-	-	-	-	-	-	-
Labrundinia virescens	-	-	0.0003	-	-	-	-	-	-	-
Nilothauma babiyi	-	-	-	0.0004	0.0004	-	-	-	-	-
Parachironomus frequens	0.0008	-	0.0012	-	-	-	-	-	-	-
Paratendipes subaequalis	-	-	-	-	-	-	-	-	-	0.0039
Paratendipes sp.	-	-	-	-	0.0004	-	-	-	-	-
Polypedilum convictum	-	0.0258	-	-	-	-	-	-	0.0017	0.0032
Polypedilum fallax group	0.0097	-	-	-	-	0.0017	-	0.0017	-	0.0420
Polypedilum halterale	0.0032	-	0.0227	-	-	-	-	-	-	0.0097

* No data at Station 3 due to disappearance of sampler.

Table F-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Hester Dendy Macroinvertebrate Biomass—Samplers Placed 6/15-18/81 Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 8 of 9)

Taxonomic Classification	Stations*									
	1	2	4	5	6	7	8	9	10	11
Polypedilum illinoense	–	–	–	–	0.0017	0.0017	–	–	–	0.0193
Polypedilum scalaenum	–	–	–	–	–	–	–	–	–	0.0065
Potthastia longimanus	–	0.0053	–	–	0.0053	–	–	–	–	–
Pseudochironomus sp.	–	–	–	–	0.0003	0.0003	–	–	–	–
Rheocricotopus sp.	0.0013	0.0135	–	0.0022	–	0.0022	–	0.0195	0.0045	0.0013
Rheotanytarsus exiguus group	0.0051	0.0256	0.0034	0.0051	–	0.0009	–	0.7171	0.0051	–
Tanytarsus guerlus group	0.0025	0.0012	0.0031	0.0019	0.0006	0.0181	–	0.6025	0.0025	0.0125
Thienemanniella xena	–	–	–	–	0.0004	–	–	–	–	–
Tribelos fuscicornis	0.0332	0.0105	0.0378	–	–	0.0217	–	–	–	0.0217
Tribelos jucundus	–	–	–	–	–	0.0266	–	–	–	–
Arthropoda-Insecta-Ephemeroptera										
Baetis sp.	–	–	–	0.0073	–	–	0.0039	0.0073	–	–
Caenis sp.	–	–	0.0069	–	–	–	–	–	–	–
Ephemerella (Serratella) sp.	–	0.0318	0.0067	–	–	–	–	–	–	–
Heptageniidae	0.0526	–	–	–	–	–	–	–	–	–
Isonychia sp.	–	–	–	0.1601	–	–	–	–	–	–
Pseudocloeon sp.	–	0.0133	–	–	–	–	–	–	–	–
Stenonema sp.	–	0.2037	0.1512	0.2497	–	0.0526	–	3.8906	–	0.0936
Tricorythodes sp.	–	–	0.0088	–	–	–	–	–	–	–
Arthropoda-Insecta-Trichoptera										
Cheumatopsyche sp.	–	0.1129	0.0084	0.0324	–	–	0.0084	0.0418	–	–
Hydropsyche sp.	–	2.3617	–	0.0341	–	–	0.0639	0.2302	–	–
Hydroptila sp.	0.0191	0.0449	–	–	–	–	0.0067	–	–	–
Oecetis sp.	–	–	0.0021	–	–	0.0082	–	–	–	–
Polycentropus sp.	–	–	–	–	–	0.0554	–	–	–	–

* No data at Station 3 due to disappearance of sampler.

Table F-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Hester Dendy Macroinvertebrate Biomass—Samplers Placed 6/15-18/81 Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 9 of 9)

Taxonomic Classification	Stations*									
	1	2	4	5	6	7	8	9	10	11
Arthropoda-Insecta-Miscellaneous										
Acroneuria sp.	-	-	0.0341	0.1961	-	-	-	-	-	-
Ancyronyx sp.	-	-	-	-	-	-	-	0.0047	-	-
Antocha sp.	-	0.0017	-	-	-	-	-	-	-	-
Ceratopogonidae (no larval key)	-	-	-	-	-	0.0019	-	-	-	-
Corydalus cornutus	-	-	-	1.2644	-	-	-	2.5289	-	-
Empididae (no larval key)	-	-	-	0.0010	-	-	-	-	-	-
Ephydridae	-	-	-	-	-	-	-	0.0009	-	-
Lanthus sp.	-	-	-	0.0077	-	-	-	-	-	-
Macronychus sp.	-	-	-	-	-	-	-	0.2627	-	-
Paragnetina sp.	-	-	-	0.0015	-	-	-	-	-	-
Perlesta sp.	0.0938	-	-	-	-	-	-	-	-	-
Simulium sp.	-	0.0033	-	-	-	-	0.0033	-	-	-
Miscellaneous Invertebrates										
Hydracarina sp.	-	0.0023	-	-	-	-	-	0.0042	-	-
Nemata	0.0006	-	-	0.0005	-	-	-	-	-	-
Podura aquatica	-	-	-	-	0.0009	-	-	-	-	-
Prostoma rubrum	-	-	-	-	-	-	-	0.0016	-	-
TOTAL WEIGHTS	0.4003	2.9665	0.3204	2.0990	0.9496	0.2362	0.1866	8.1212	0.0356	0.6255

* No data at Station 3 due to disappearance of sampler.

Source: WAR, 1981.

Table F-3

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M):									
STA LOC:	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
HORIZ LOC:	20	40	60	80	20	40	60	80	20	40
VERT LOC:										
PHYLUM ANNELIDA										
PHYLUM ANNELIDA - CLASS HIRUDINEA										
HIRUDINEA	-	-	-	-	-	-	-	-	-	-
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
NAIS ELINGUIS	-	-	-	-	-	-	-	-	-	-
NAIS PSEUDOBTUSA	-	-	-	-	-	-	-	-	-	-
OPHIDONAIS SERPENTINA	-	-	-	-	-	-	-	-	11	-
PRISTINA OSBORNI	-	-	-	-	-	-	-	-	-	-
STYLARIA LACUSTRIS	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	-	-	-
LIMNODRILUS HOFFMEISTERI	-	-	-	-	-	-	-	-	-	-
TUBIFICIDAE, IMMATURE	-	11	-	-	-	-	-	-	-	32
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
(CERNOSVITOVIELLA) SP	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE C	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE SP A	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE SP B	-	-	-	-	-	-	-	-	-	-
LUMBRICILLUS SP	-	-	-	-	-	-	-	-	-	-
LUMBRICULIDAE	-	-	-	-	-	-	-	-	-	-

Table F-3 (Continued, Page 2 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M):									
STA LOC:	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
HORIZ LOC:	20	40	60	80	20	40	60	80	20	40
VERT LOC:										
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	-	-	-	-	-	-	-	-	11	21
PHYLUM MOLLUSCA - CLASS GASTROPODA										
LAEVIPEX SP	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
ASELLUS SP	-	-	-	-	-	-	-	-	-	-
HYALELLA AZTECA	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
BRILLIA PAR	-	-	-	-	-	-	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
CLADOTANYTARSUS SP	-	-	-	-	-	-	-	-	-	-
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	-	-	32
NEAR CORYNONEURA SP B	-	32	21	-	11	-	21	-	345	603
CRICOTOPUS-ORTHOCLADIUS	32	-	11	-	-	-	-	-	-	11
CRYPTOCHIRONOMUS FULVUS GROUP	-	-	-	-	-	-	-	-	-	-
DIAMESA SP	-	-	-	-	-	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	-	-	-	-	-	-	-
EUKIEFFERIELLA CLARIPENNIS GROUP	-	-	-	-	-	-	-	-	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	-	-	-	-	-	-	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
NANOCLADIUS CRASSICORNUS	-	-	-	-	-	11	-	-	-	-
NILOTANYPUS SP	-	-	-	-	-	-	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	-	-	-	-	-	-	-
PARAMETRIOCNEMUS SP (TENT.)	-	-	-	-	-	-	-	-	-	-
PARAPHAENOCLADIUS SP	-	-	-	-	-	-	-	-	-	-
NEAR PARATENDIPES	-	-	-	-	-	-	-	-	-	-

Table F-3 (Continued, Page 3 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M):									
STA LOC:	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
HORIZ LOC:	20	40	60	80	20	40	60	80	20	40
VERT LOC:										
POLYPEDILUM HALTERALE	-	-	-	-	-	-	-	-	11	43
POLYPEDILUM SP	-	-	-	-	-	-	-	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	-	-	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	-	-	-	-	-	-	-
ROBACKIA DEMEIJEREI	-	-	54	11	-	-	-	-	-	-
SMITTIA ATERRIMA	-	-	-	-	-	-	-	-	-	-
TANYTARSUS COFFMANI	-	-	-	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	-	-	-	-	-	-	-
TANYTARSUS SP	-	-	-	-	-	-	-	-	-	-
THIENEMANNIELLA XENA	-	11	-	-	-	-	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
BAETIS SP	-	-	-	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-	-	-	-	-	-	-
STENONEMA ANNEXUM	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILA SP	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	-	-	-	-	-
BRACHYPTERA SP	-	-	-	-	-	-	-	-	-	-
CHRYSOZONA SP	-	-	-	-	-	-	-	-	-	-
CORDULEGASTER SP	-	-	-	-	-	-	-	-	-	-
DASYHELEA SP	-	-	-	-	-	-	-	-	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	-	-	-	-	-	-	-
EPHYDRIDAE	-	-	-	-	-	-	-	-	-	-
HASTAPERLA SP	-	-	-	-	-	-	-	-	-	-
ISOGENUS SP	-	-	-	-	-	-	-	-	-	-
NEMOCAPNIA SP	-	-	-	11	-	-	-	-	11	-
NEMOURA SP	-	-	-	-	-	-	-	-	-	-
OCTOGOMPHUS SP	-	-	-	-	-	-	-	-	-	-
PALPOMYIA-SPHAEROMIAS	-	-	-	-	-	-	-	-	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	11
STENELMIS SP	-	-	-	-	-	-	-	-	-	-
TIPULIDAE	-	-	-	-	-	-	-	-	-	-

Table F-3 (Continued, Page 4 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /250 M):									
STA LOC:	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
HORIZ LOC:	20	40	60	80	20	40	60	80	20	40
VERT LOC:										
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
RHABDOCOELA	366	2336	808	562	97	118	32	-	97	162
TURBELLARIA	-	-	-	-	-	-	-	-	-	-
MISCELLANEOUS INVERTEBRATES										
ACARI	-	-	-	-	-	-	-	-	-	-
BATHYONCHUS SP	-	-	-	-	-	-	-	-	-	-
CRYPTONCHUS SP	-	-	-	-	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	-	-	-	-	-	-
XIPHINEMA SP	-	-	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS	366	2352	894	604	108	129	53	0	466	915
NUMBER OF TAXA	2	4	4	3	2	2	2	0	6	6

Table F-3 (Continued, Page 5 of 21)

BIOSTAT VERSION II

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC: HORIZ LOC: VERT LOC:	3C 60	3D 60	4A 20	4B 40	4C 60	4D 80	5A 20	5B 40	5C 60	5D 80
PHYLUM ANNELIDA										
PHYLUM ANNELIDA - CLASS HIRUDINEA										
HIRUDINEA	-	-	-	-	-	-	-	-	-	-
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
NAIS ELINGUIS	-	-	453	1519	981	1422	-	-	-	-
NAIS PSEUDOBTUSA	-	-	-	-	-	-	-	-	-	-
OPHIDONAIS SERPENTINA	-	-	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	-	-	-	-	-	-	-	-	-	-
STYLARIA LACUSTRIS	-	-	11	-	11	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	-	-	-
LIMNODRILUS HOFFMEISTERI	-	-	-	-	-	-	-	-	-	-
TUBIFICIDAE, IMMATURE	-	-	-	-	-	32	21	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
(CERNOSVITOVIELLA) SP	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE C	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE SP A	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE SP B	-	-	-	-	-	-	-	-	-	-
LUMBRICILLUS SP	-	-	-	-	-	-	11	-	-	-
LUMBRICULIDAE	-	-	-	-	-	11	-	-	-	-

Table F-3 (Continued, Page 6 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC: / HORIZ LOC: / VERT LOC:	3C / 60	3D / 80	4A / 20	4B / 40	4C / 60	4D / 80	5A / 20	5B / 40	5C / 60	5D / 60
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	11	11	-	-	-	-	-	-	-	-
PHYLUM MOLLUSCA - CLASS GASTROPODA										
LAEVIPEX SP	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
ASELLUS SP	-	-	-	-	-	-	-	-	-	-
HYALELLA AZTECA	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
BRILLIA PAR	-	-	-	-	-	-	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
CLADOTANYTARSUS SP	-	-	-	11	-	11	-	-	-	-
CORYNONEURA CELERIPES	11	11	86	21	11	-	11	-	-	-
NEAR CORYNONEURA SP B	-	332	-	-	-	-	65	215	54	66
CRICOTOPUS-ORTHOCLADIUS	-	-	2263	10463	6530	6110	-	-	-	-
CRYPTOCHIRONOMUS FULVUS GROUP	-	-	32	43	21	183	-	-	-	-
DIAMESA SP	-	-	-	43	97	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	-	-	-	-	-	-	-
EUKIEFFERIELLA CLARIPENNIS GROUP	-	-	108	106	11	32	-	-	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	-	11	-	-	-	-	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
NANOCLADIUS CRASSICORNUS	-	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	-	-	108	-	-	-	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	65	43	215	-	-	-	-
PARAMETRIOCNEMUS SP (TENT.)	-	-	-	-	-	-	-	-	-	-
PARAPHAENOCLADIUS SP	-	-	-	-	-	-	-	-	-	-
NEAR PARATENDIPES	-	-	269	75	21	-	-	-	-	-

Table F-3 (Continued, Page 7 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC:	3C	3D	4A	4B	4C	4D	5A	5B	5C	5D
HORIZ LOC:	60	60	20	40	60	80	20	40	60	60
VERT LOC:										
POLYPEDILUM HALTERALE	-	-	66	505	75	65	-	-	-	-
POLYPEDILUM SP	-	-	-	21	11	-	-	140	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	32	-	-	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	21	11	54	32	11	-	-	-	-
ROBACKIA DEMEIJEREA	43	-	571	517	75	-	-	-	-	-
SMITTIA ATERRIMA	-	-	-	-	-	-	-	-	-	-
TANYTARSUS COFFMANI	-	-	11	-	11	172	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	11	21	-	32	-	-	-	-
TANYTARSUS SP	-	-	-	-	-	-	-	-	-	-
THIENEMANNIELLA XENA	-	-	11	-	43	11	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
BAETIS SP	-	-	-	-	-	-	11	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	11	43	21	-	11	-	-
STENONEMA ANNEXUM	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	11	-	32	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	11	-	-	-	-	-
HYDROPTILA SP	-	-	-	-	65	215	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	183	-	-	-	-
BRACHYPTERA SP	-	-	-	-	-	-	-	-	-	-
CHRYSOZONA SP	-	-	-	-	-	-	-	-	-	-
CORDULEGASTER SP	-	-	-	-	-	-	-	-	-	-
DASYHELEA SP	-	-	-	-	-	-	-	-	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	21	11	32	-	-	-	-
EPHYDRIDAE	-	-	11	-	-	-	-	-	-	-
HASTAPERLA SP	-	-	-	-	-	-	-	-	-	-
ISOGENUS SP	-	-	21	11	-	-	-	-	-	-
NEMOCAPNIA SP	21	11	-	-	-	-	43	684	108	32
NEMOURA SP	-	-	-	11	11	21	-	-	-	-
OCTOGOMPHUS SP	-	-	-	-	-	-	-	-	-	-
PALPOMYIA-SPHAEROMIAS	-	-	-	-	-	-	-	-	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	11	-	11	-	-	-	-	-
TIPULIDAE	-	-	-	-	-	11	-	-	-	-

Table F-3 (Continued, Page 9 of 21)

B I O S T A T V E R S I O N II

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0025

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC:	6A	6B	6C	6D	7A	7B	7C	7D	8A	8C
HORIZ LOC:	10	40	60	90	20	40	60	80	0.5	60
VERT LOC:										
PHYLUM ANNELIDA										
PHYLUM ANNELIDA - CLASS HIRUDINEA										
HIRUDINEA	-	-	-	-	-	-	-	-	-	-
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
NAIS ELINGUIS	-	-	-	-	-	-	-	-	-	-
NAIS PSEUDOBTUSA	-	-	32	11	-	-	-	-	-	-
OPHIDONAIS SERPENTINA	-	-	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	21	-	-	11	-	21	-	-	-	-
STYLARIA LACUSTRIS	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	-	11	-
LIMNODRILUS HOFFMEISTERI	-	-	-	-	-	-	-	-	129	-
TUBIFICIDAE, IMMATURE	11	-	-	-	-	-	11	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
(CERNOSVITOVIELLA) SP	32	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE C	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE SP A	-	-	-	11	-	-	-	-	75	21
ENCHYTRAEIDAE SP B	-	-	-	11	-	-	-	-	11	-
LUMBRICILLUS SP	32	11	-	21	-	-	-	-	11	-
LUMBRICULIDAE	-	-	-	-	-	-	-	-	-	-

NOTE: Benthic sample for 8-B not collected since substrate was bedrock.

Table F-3 (Continued, Page 9 of 21)

B I O S T A T   V E R S I O N   I I

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO./50 M²):									
STA LOC:	6A	6B	6C	6D	7A	7B	7C	7D	8A	8C
HORIZ LOC:	10	40	60	90	20	40	60	80	0.5	60
VERT LOC:										
PHYLUM ANNELIDA										
PHYLUM ANNELIDA - CLASS HIRUDINEA										
HIRUDINEA	-	-	-	-	-	-	-	-	-	-
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
NAIS ELINGUIS	-	-	-	-	-	-	-	-	-	-
NAIS PSEUDOBTUSA	-	-	32	11	-	-	-	-	-	-
OPHIDONAIS SERPENTINA	-	-	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	21	-	-	11	-	21	-	-	-	-
STYLARIA LACUSTRIS	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	-	11	-
LIMNODRILUS HOFFMEISTERI	-	-	-	-	-	-	-	-	129	-
TUBIFICIDAE, IMMATURE	11	-	-	-	-	-	11	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
(CERNOSVITOVIELLA) SP	32	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE C	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE SP A	-	-	-	11	-	-	-	-	75	21
ENCHYTRAEIDAE SP B	-	-	-	11	-	-	-	-	11	-
LUMBRICILLUS SP	32	11	-	21	-	-	-	-	11	-
LUMBRICULIDAE	-	-	-	-	-	-	-	-	-	-

NOTE: Benthic sample for 8-B not collected since substrate was bedrock.

Table F-3 (Continued, Page 10 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO./SQ M):									
STA LOC:	6A	6B	6C	6D	7A	7B	7C	7D	8A	8C
HORIZ LOC:	10	40	60	90	20	40	60	80	0.5	60
VERT LOC:										
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	-	-	-	-	-	-	-	-	-	-
PHYLUM MOLLUSCA - CLASS GASTROPODA										
LAEVIPEX SP	-	-	-	-	-	11	-	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
ASELLUS SP	-	-	-	-	-	-	-	-	-	-
HYALELLA AZTECA	-	-	21	-	-	-	-	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
BRILLIA PAR	-	-	-	-	11	-	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	-	21	-
CLADOTANYTARSUS SP	-	-	-	-	-	11	-	-	-	-
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	-	-	-
NEAR CORYNONEURA SP B	-	-	-	-	-	-	-	-	-	-
CRICOTOPUS-ORTHOCLADIUS	21	-	154	-	116	151	65	54	11	11
CRYPTOCHIRONOMUS FULVUS GROUP	-	-	-	-	11	43	-	11	11	-
DIAMESA SP	-	-	-	-	-	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	-	-	-	-	-	11	-
EUKIEFFERIELLA CLARIPENNIS GROUP	-	-	-	-	-	-	-	-	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	-	-	-	-	11	-	-	-	-
MICROTENDIPES SP	-	-	-	-	32	86	21	32	-	-
NANOCLADIUS CRASSICORNUS	-	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	-	-	-	-	-	-	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	-	-	-	11	-	-	-
PARAMETRIOCNEMUS SP (TENT.)	-	-	-	-	-	-	-	-	-	-
PARAPHAENOCLADIUS SP	-	-	11	-	-	-	-	-	-	-
NEAR PARATENDIPES	-	-	-	-	-	-	-	-	-	-

Table F-3 (Continued, Page 11 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO./50 M²):									
STA LOC:	6A	6B	6C	6D	7A	7B	7C	7D	8A	8C
HORIZ LOC:	10	40	60	90	20	40	60	80	0.5	60
VERT LOC:										
POLYPEDILUM HALTERALE	-	-	-	-	43	11	-	21	302	-
POLYPEDILUM SP	-	-	-	-	-	-	-	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	-	-	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	-	-	-	11	-	-	-
ROBACKIA DEMEIJEREA	-	11	57	54	-	11	21	55	-	-
SMITTIA ATERRIMA	-	-	-	-	11	-	-	-	-	-
TANYTARSUS COFFMANI	-	-	-	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	-	11	11	-	11	-	-
TANYTARSUS SP	-	-	-	-	-	-	11	-	-	-
THIENEMANNIELLA XENA	-	-	-	-	11	-	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	-	11	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
BAETIS SP	-	-	-	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-	97	-	11	11	-	-
STENONEMA ANNEXUM	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILA SP	-	-	-	-	11	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	11	-	-	-	-
BRACHYPTERA SP	-	-	-	-	-	11	-	-	-	-
CHRYSOZONA SP	-	-	-	-	11	-	-	-	-	-
CORDULEGASTER SP	-	-	-	-	-	11	-	-	-	-
DASYHELEA SP	-	-	11	-	-	-	-	-	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	-	-	-	-	-	-	-
EPHYDRIDAE	-	-	-	-	-	-	-	-	-	-
HASTAPERLA SP	-	-	-	-	21	-	-	21	-	-
ISOGENUS SP	-	-	-	-	-	-	-	-	-	-
NEMOCAPNIA SP	-	-	-	-	-	-	-	-	-	-
NEMOURA SP	-	-	-	-	11	-	-	-	-	-
OCTOGOMPHUS SP	-	-	-	-	-	-	21	-	-	-
PALPOMYIA-SPHAEROMIAS	-	-	-	-	-	-	-	-	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	-	-	-	-	11	-	-	-
TIPULIDAE	-	-	-	-	-	-	-	-	-	-

Table F-3 (Continued, Page 12 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC: / HORIZ LOC: / VERT LOC:	6A 10	6B 40	6C 60	6D 90	7A 20	7B 40	7C 60	7D 80	8A 0.5	8C 60
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
RHABDOCOELA	21	2909	1476	1961	-	-	-	-	32	-
TURBELLARIA	-	11	-	-	-	-	-	-	-	32
MISCELLANEOUS INVERTEBRATES										
ACARI	-	-	-	-	-	-	-	-	-	-
BATHYCNCHUS SP	11	-	-	-	-	-	-	-	-	-
CRYPTONCHUS SP	-	-	11	-	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	-	-	-	-	-	-
XIPHINEMA SP	-	-	-	11	-	-	-	-	11	-
TOTAL NUMBER OF ORGANISMS	149	2942	1853	2091	399	400	154	225	647	64
NUMBER OF TAXA	7	4	8	8	13	13	10	6	13	3

Table F-3 (Continued, Page 13 of 21)

B I O S T A T   V E R S I O N   I I

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC:	8D	9A	9B	9C	9D	10A	10B	10C	10D	11A
HORIZ LOC:	80	20	40	60	80	1	2	3	10	20
VERT LOC:										
PHYLUM ANNELIDA										
PHYLUM ANNELIDA - CLASS HIRUDINEA										
HIRUDINEA	-	11	-	-	-	-	-	-	-	-
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
NAIS ELINGUIS	-	-	-	-	-	-	-	-	-	-
NAIS PSEUDOBTUSA	11	-	-	-	-	-	-	-	-	-
OPHIDONAIS SERPENTINA	-	-	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	-	-	-	-	-	-	-	-	-	-
STYLARIA LACUSTRIS	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	-	1465	-
LIMNODRILUS HOFFMEISTERI	-	11	21	43	21	43	11	550	2026	54
TUBIFICIDAE, IMMATURE	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
(CERNOSVITOVIELLA) SP	-	-	-	-	-	-	-	-	-	-
ENCHYTRAEIDAE C	-	-	-	-	-	-	-	21	21	-
ENCHYTRAEIDAE SP A	11	-	-	-	-	-	-	21	-	-
ENCHYTRAEIDAE SP B	-	-	-	-	-	-	-	-	-	-
LUMBRICILLUS SP	21	-	-	-	-	-	-	153	-	-
LUMBRICULIDAE	-	-	-	-	-	-	-	-	11	-

Table F-3 (Continued, Page 14 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC: / HORIZ LOC: / VERT LOC:	8D / 80	9A / 20	9B / 40	9C / 60	9D / 80	10A / 1	10B / 2	10C / 3	10D / 10	11A / 20
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	-	-	-	-	-	-	-	11	-	-
PHYLUM MOLLUSCA - CLASS GASTROPODA										
LAEVIPEX SP	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
ASELLUS SP	-	-	-	-	-	-	-	11	-	-
HYALELLA AZTECA	-	-	-	-	-	-	-	172	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
BRILLIA PAR	-	-	-	-	-	-	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	-	526	-
CLADOTANYTARSUS SP	-	-	-	-	-	-	-	11	-	-
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	-	-	-
NEAR CORYNONEURA SP B	-	-	-	-	-	-	-	-	-	-
CRICOTOPUS-ORTHOCLADIUS	32	21	21	11	-	11	-	129	-	11
CRYPTOCHIRONOMUS FULVUS GROUP	-	-	-	-	-	-	-	11	32	-
DIAMESA SP	-	-	-	-	-	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	-	-	-	11	1746	2446	-
EUKIEFFERIELLA CLARIPENNIS GROUP	-	-	-	-	-	-	-	-	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	-	-	-	-	-	-	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
NANOCLADIUS CRASSICORNUS	-	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	-	-	-	-	-	-	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	-	-	-	-	-	-	-
PARAMETRIOCNEMUS SP (TENT.)	-	-	-	-	-	-	-	21	-	-
PARAPHAENOCLADIUS SP	-	-	-	-	-	-	-	-	-	-
NEAR PARATENDIPES	-	-	-	-	-	-	-	-	-	-

Table F-3 (Continued, Page 15 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC:	8D	9A	9B	9C	9D	10A	10B	10C	10D	11A
HORIZ LOC:	80	20	40	60	80	1	2	3	10	20
VERT LOC:										
POLYPEDILUM HALTERALE	-	-	-	-	-	-	-	11	-	43
POLYPEDILUM SP	-	-	-	-	-	-	-	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	-	11	11	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	11	-	-	-	-	-	-
ROBACKIA DEMEIJEREA	-	11	11	11	-	-	-	-	-	-
SMITTIA ATERRIMA	-	-	-	-	-	-	-	-	-	-
TANYTARSUS COFFMANI	-	-	-	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	-	-	-	-	-	43	-
TANYTARSUS SP	-	-	-	-	-	-	-	-	-	-
THIENEMANNIELLA XENA	-	-	-	-	-	-	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	-	11	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
BAETIS SP	-	-	-	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-	-	-	-	-	-	-
STENONEMA ANNEXUM	-	11	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	11	-	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILA SP	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	-	-	-	-	-
BRACHYPTERA SP	-	-	-	-	-	-	-	-	-	-
CHRYSOZONA SP	-	-	-	-	-	-	-	-	-	-
CORDULEGASTER SP	-	-	-	-	-	-	-	-	-	-
DASYHELEA SP	-	-	-	-	-	-	-	11	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	21	-	-	-	-	-	-	-
EPHYDRIDAE	-	-	-	-	-	-	-	-	-	-
HASTAPERLA SP	-	-	-	-	-	-	-	-	-	-
ISOGENUS SP	-	-	-	-	-	-	-	-	-	-
NEMOCAPNIA SP	-	-	-	-	-	-	-	-	-	-
NEMOURA SP	-	-	-	-	-	-	-	-	-	-
OCTOGOMPHUS SP	-	-	-	-	-	-	-	-	-	-
PALPOMYIA-SPHAEROMIAS	-	-	-	-	-	-	-	-	11	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	-	-	-	-	-	-	-	-
TIPULIDAE	-	-	-	-	-	-	-	-	-	-

Table F-3 (Continued, Page 16 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC: / HORIZ LOC: / VERT LOC:	6D 60	9A 20	9B 40	9C 60	9D 80	10A 1	10B 2	10C 3	10D 10	11A 20
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
RHABDOCOELA	-	-	-	-	-	-	-	-	11	-
TURBELLARIA	11	-	-	-	-	-	-	106	-	-
MISCELLANEOUS INVERTEBRATES										
ACARI	-	-	-	-	-	-	-	-	-	-
BATHYONCHUS SP	-	-	-	-	-	-	-	-	-	-
CRYPTONCHUS SP	-	-	-	-	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	-	-	-	-	-	-
XIPHINEMA SP	-	-	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS	86	65	74	87	21	54	22	3038	6616	106
NUMBER OF TAXA	5	5	4	5	1	2	2	16	12	3

Table F-3 (Continued, Page 17 of 21)

B I O S T A T   V E R S I O N   II

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):		
STA LOC:	11B	11C	11D
HORIZ LOC:	40	60	80
VERT LOC:			
PHYLUM ANNELIDA			
PHYLUM ANNELIDA - CLASS HIRUDINEA			
HIRUDINEA	-	-	-
PHYLUM ANNELIDA - CLASS OLIGOCHAETA			
ANNELIDA - OLIGOCHAETA - NAIDIDAE			
NAIS ELINGUIS	-	-	-
NAIS PSEUDOBTUSA	-	-	-
OPHIDONAIS SERPENTINA	-	-	-
PRISTINA OSBORNI	-	-	-
STYLARIA LACUSTRIS	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE			
ILYODRILUS TEMPLETONI	-	-	-
LIMNODRILUS HOFFMEISTERI	-	21	-
TUBIFICIDAE, IMMATURE	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS			
(CERNOSVITOVIELLA) SP	-	-	-
ENCHYTRAEIDAE C	-	-	-
ENCHYTRAEIDAE SP A	-	-	-
ENCHYTRAEIDAE SP B	-	-	-
LUMBRICILLUS SP	-	-	-
LUMBRICULIDAE	-	-	-

Table F-3 (Continued, Page 18 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):		
STA LOC: / HORIZ LOC: / VERT LOC:	11B / 40	11C / 60	11D / 80
PHYLUM MOLLUSCA			
PHYLUM MOLLUSCA - CLASS PELECYPODA			
CORBICULA FLUMINEA	-	-	-
PHYLUM MOLLUSCA - CLASS GASTROPODA			
LAEVIPEX SP	-	-	-
PHYLUM ARTHROPODA			
PHYLUM ARTHROPODA - CLASS CRUSTACEA			
ASELLUS SP	-	-	-
HYALELLA AZTECA	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA			
ARTHROPODA - INSECTA - CHIRONOMIDAE			
BRILLIA PAR	-	-	-
CHIRONOMUS SP	-	-	-
CLADOTANYTARSUS SP	-	-	-
CORYNONEURA CELERIPES	-	-	-
NEAR CORYNONEURA SP B	-	-	-
CRICOTOPUS-ORTHOCLADIUS	-	-	-
CRYPTOCHIRONOMUS FULVUS GROUP	-	-	-
DIAMESA SP	-	-	11
DICROTENDIPES NEOMODESTUS	-	-	-
EUKIEFFERIELLA CLARIPENNIS GROUP	-	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	-	-
MICROTENDIPES SP	-	-	-
NANOCLADIUS CRASSICORNUS	-	-	-
NILOTANYPUS SP	-	-	-
PARAKIEFFERIELLA SP	-	-	-
PARAMETRIOCNEMUS SP (TENT.)	-	-	-
PARAPHAENOCLADIUS SP	-	-	-
NEAR PARATENDIPES	-	-	-

Table F-3 (Continued, Page 19 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M):									
STA LOC: / HORIZ LOC: / VERT LOC:	11B 40	11C 60	11D 80							
POLYPEDILUM HALTERALE	54	11	11	*******	*******	*******	*******	*******	*******	*******
POLYPEDILUM SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
POTTHASTIA LONGIMANUS	-	-	-	*******	*******	*******	*******	*******	*******	*******
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	*******	*******	*******	*******	*******	*******	*******
ROBACKIA DEMEIJEREA	-	-	-	*******	*******	*******	*******	*******	*******	*******
SMITTIA ATERRIMA	-	-	-	*******	*******	*******	*******	*******	*******	*******
TANYTARSUS COFFMANI	-	-	-	*******	*******	*******	*******	*******	*******	*******
TANYTARSUS GUERLUS GROUP	-	-	-	*******	*******	*******	*******	*******	*******	*******
TANYTARSUS SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
THIENEMANNIELLA XENA	-	-	-	*******	*******	*******	*******	*******	*******	*******
TRIBELOS JUCUNDUS	-	-	-	*******	*******	*******	*******	*******	*******	*******
ARTHROPODA - INSECTA - EPHEMEROPTERA										
BAETIS SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
EPHEMERELLA (SERRATELLA) SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
STENONEMA ANNEXUM	-	-	-	*******	*******	*******	*******	*******	*******	*******
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
HYDROPSYCHE SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
HYDROPTILA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
BRACHYPTERA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
CHRYSOZONA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
CORDULEGASTER SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
DASYHELEA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
EMPIDIDAE (NO LARVAL KEY)	-	-	-	*******	*******	*******	*******	*******	*******	*******
EPHYDRIDAE	-	-	-	*******	*******	*******	*******	*******	*******	*******
HASTAPERLA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
ISOGENUS SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
NEMOCAPNIA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
NEMOURA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
OCTOGOMPHUS SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
PALPOMYIA-SPHAEROMIAS	-	-	-	*******	*******	*******	*******	*******	*******	*******
SIMULIUM SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
STENELMIS SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
TIPULIDAE	-	-	-	*******	*******	*******	*******	*******	*******	*******

Table F-3 (Continued, Page 20 of 21)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
STA LOC: / HORIZ LOC: / VERT LOC:	11B / 40	11C / 60	11D / 80							
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
RHABDOCOELA	-	-	-	*******	*******	*******	*******	*******	*******	*******
TURBELLARIA	-	-	-	*******	*******	*******	*******	*******	*******	*******
MISCELLANEOUS INVERTEBRATES										
ACARI	-	-	-	*******	*******	*******	*******	*******	*******	*******
BATHYONCHUS SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
CRYPTONCHUS SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
PODURA AQUATICA	-	-	-	*******	*******	*******	*******	*******	*******	*******
XIPHINEMA SP	-	-	-	*******	*******	*******	*******	*******	*******	*******
TOTAL NUMBER OF ORGANISMS	54	32	22	******	******	******	******	******	******	******
NUMBER OF TAXA	1	2	2	******	******	******	******	******	******	******

Table F-3 (Continued, Page 21 of 21)

SHANNON - WEAVER SPECIES DIVERSITY INDEX

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

STATION	MAGNITUDE
1A	0.404
1B	0.167
1C	0.582
1D	0.262
2A	0.475
2B	0.420
2C	0.969
2D	0.0
3A	1.310
3B	1.663
3C	1.673
3D	1.462
4A	2.538
4B	1.500
4C	1.274
4D	1.799
5A	1.758
5B	1.722
5C	0.836
5D	0.866
6A	2.704
6B	0.107
6C	1.131
6D	0.469
7A	3.020
7B	2.660
7C	2.979
7D	2.064
8A	2.512
8C	1.464
8D	2.166
9A	2.262
9B	1.956
9C	2.011
9D	0.0
10A	0.729
10B	1.000
10C	2.107
10D	2.014
11A	1.365
11B	0.0
11C	0.928
11D	1.000

Table F-4 1

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

PASS TWO - CODED DATA USED/STATIONS COLLAPSED

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):										
STA LOC: / HORIZ LOC: / VERT LOC:	1	2	3	4	5	6	7	8	9	10	11
PHYLUM ANNELIDA											
PHYLUM ANNELIDA - CLASS HIRUDINEA											
HIRUDINEA	-	-	-	-	-	-	-	-	3	-	-
PHYLUM ANNELIDA - CLASS OLIGOCHAETA											
ANNELIDA - OLIGOCHAETA - NAIDIDAE											
NAIS ELINGUIS	-	-	-	1094	-	-	-	-	-	-	-
NAIS PSEUDOBTUSA	-	-	-	-	-	11	-	4	-	-	-
OPHIDONAIS SERPENTINA	-	-	3	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	-	-	-	-	-	8	5	-	-	-	-
STYLARIA LACUSTRIS	-	-	-	5	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE											
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	4	-	366	-
LIMNODRILUS HOFFMEISTERI	-	-	-	-	-	-	-	43	24	660	19
TUBIFICIDAE, IMMATURE	3	-	8	8	5	3	3	-	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS											
(CERNOSVITOVIELLA) SP	-	-	-	-	-	8	-	-	-	-	-
ENCHYTRAEIDAE C	-	-	-	-	-	-	-	-	-	11	-
ENCHYTRAEIDAE SP A	-	-	-	-	-	3	-	36	-	5	-
ENCHYTRAEIDAE SP B	-	-	-	-	-	3	-	4	-	-	-
LUMBRICILLUS SP	-	-	-	-	3	16	-	11	-	46	-
LUMBRICULIDAE	-	-	-	3	-	-	-	-	-	3	-

Table F-4 (Continued, Page 2 of 9)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO / SQ M):										
STA LOC: / HORIZ LOC: / VERT LOC:	1	2	3	4	5	6	7	8	9	10	11
PHYLUM MOLLUSCA											
PHYLUM MOLLUSCA - CLASS PELECYPODA											
CORBICULA FLUMINEA	-	-	13	-	-	-	-	-	-	3	-
PHYLUM MOLLUSCA - CLASS GASTROPODA											
LAEVIPEX SP	-	-	-	-	-	-	3	-	-	-	-
PHYLUM ARTHROPODA											
PHYLUM ARTHROPODA - CLASS CRUSTACEA											
ASELLUS SP	-	-	-	-	-	-	-	-	-	3	-
HYALELLA AZTECA	-	-	-	-	-	5	-	-	-	43	-
PHYLUM ARTHROPODA - CLASS INSECTA											
ARTHROPODA - INSECTA - CHIRONOMIDAE											
BRILLIA PAR	-	-	-	-	-	-	3	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	7	-	132	-
CLADOTANYTARSUS SP	-	-	-	5	-	-	3	-	-	3	-
CORYNONEURA CELERIPES	-	-	13	39	3	-	-	-	-	-	-
NEAR CORYNONEURA SP B	13	2	312	-	105	-	-	-	-	-	-
CRICOTOPUS-ORTHOCLADIUS	11	-	3	6341	-	54	57	18	13	35	3
CRYPTOCHIRONOMUS FULVUS GROUP	-	-	-	70	-	-	16	4	-	11	-
DIAMESA SP	-	-	-	35	-	-	-	-	-	-	3
DICROTENDIPES NEOMODESTUS	-	-	-	-	-	-	-	4	-	1051	-
EUKIEFFERIELLA CLARIPENNIS GROUP	-	-	-	65	-	-	-	-	-	-	-
EUKIEFFERIELLA DISCOLORIPES GROUP	-	-	-	3	-	-	3	-	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	43	-	-	-	-
NANOCLADIUS CRASSICORNUS	-	P	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	-	-	-	27	-	-	-	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	81	-	-	3	-	-	-	-
PARAMETRIOCNEMUS SP (TENT.)	-	-	-	-	-	-	-	-	-	5	-
PARAPHAENOCLADIUS SP	-	-	-	-	-	3	-	-	-	-	-
NEAR PARATENDIPES	-	-	-	92	-	-	-	-	-	-	-

Table F-4 (Continued, Page 3 of 9)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):										
STA LOC: / HORIZ LOC: / VERT LOC:	1	2	3	4	5	6	7	8	9	10	11
POLYPEDILUM HALTERALE	-	-	13	283	-	-	19	101	-	3	30
POLYPEDILUM SP	-	-	-	6	35	-	-	-	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	8	-	-	-	-	-	5	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	5	27	-	-	3	-	3	-	-
RUBACKIA DEMEIJEREA	16	-	11	291	-	40	24	-	8	-	-
SMITTIA ATERRIMA	-	-	-	-	-	-	3	-	-	-	-
TANYTARSUS COFFMANI	-	-	-	46	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	16	-	-	6	-	-	11	-
TANYTARSUS SP	-	-	-	-	-	-	3	-	-	-	-
THIENEMANNIELLA XENA	3	-	-	16	-	-	3	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	4	-	3	-
ARTHROPODA - INSECTA - EPHEMEROPTERA											
BAETIS SP	-	-	-	-	3	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	19	3	-	30	-	-	-	-
STENONEMA ANNEXUM	-	-	-	-	-	-	-	-	3	-	-
ARTHROPODA - INSECTA - TRICHOPTERA											
CHEUMATOPSYCHE SP	-	-	-	11	-	-	-	-	3	-	-
HYDROPSYCHE SP	-	-	-	3	-	-	-	-	-	-	-
HYDROPTILA SP	-	-	-	70	-	-	3	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS											
ANTOCHA SP	-	-	-	46	-	-	3	-	-	-	-
BRACHYPTERA SP	-	-	-	-	-	-	3	-	-	-	-
CHRYSOZONA SP	-	-	-	-	-	-	3	-	-	-	-
CORDULEGASTER SP	-	-	-	-	-	-	3	-	-	-	-
DASYHELEA SP	-	-	-	-	-	3	-	-	-	3	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	16	-	-	-	-	5	-	-
EPHYDRIDAE	-	-	-	3	-	-	-	-	-	-	-
HASTAPERLA SP	-	-	-	-	-	-	11	-	-	-	-
ISOGENUS SP	-	-	-	8	-	-	-	-	-	-	-
NEMOCAPNIA SP	3	-	11	-	267	-	-	-	-	-	-
NEMOURA SP	-	-	-	11	-	-	3	-	-	-	-
OCTOGOMPHUS SP	-	-	-	-	-	-	5	-	-	-	-
PALPOMYIA-SPHAEROMIAS	-	-	-	-	-	-	-	-	-	3	-
SIMULIUM SP	-	-	3	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	-	5	-	-	3	-	-	-	-
TIPULIDAE	-	-	-	3	-	-	-	-	-	-	-

Table F-4 (Continued, Page 4 of 9)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):										
STA LOC: HORIZ LOC: VERT LOC:	1	2	3	4	5	6	7	8	9	10	11
PHYLUM PLATYHELMINTHES											
PHYLUM PLATYHELMINTHES - TURBELLARIA											
RHABDOCOELA	1024	18	121	306	504	1592	-	11	-	3	-
TURBELLARIA	-	-	-	-	-	3	-	14	-	27	-
MISCELLANEOUS INVERTEBRATES											
ACARI	-	-	-	3	-	-	-	-	-	-	-
BATHYONCHUS SP	-	-	-	-	-	3	-	-	-	-	-
CRYPTONCHUS SP	-	-	-	35	-	3	-	-	-	-	-
PODURA AQUATICA	-	-	-	3	-	-	-	-	-	-	-
XIPHINEMA SP	-	-	-	35	-	3	-	4	-	-	-
TOTAL NUMBER OF ORGANISMS	1073	21	516	9193	928	1761	309	269	62	2435	55
NUMBER OF TAXA	7	3	12	38	9	17	27	15	6	23	4

Table F-4 (Continued, Page 5 of 9)

SHANNON - WEAVER SPECIES DIVERSITY INDEX

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 2/9-15/81

STATION	MAGNITUDE
1	0.371
2	0.723
3	1.855
4	1.932
5	1.677
6	0.753
7	3.606
8	2.971
9	2.522
10	2.311
11	1.405

Table F-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 2/9-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 6 of 9)

Taxonomic Classification	Stations 1	2	3	4	5	6	7	8	9	10	11
Annelida-Hirudinea											
Hirudinea	–	–	–	–	–	–	–	–	0.0033	–	
Annelida-Oligochaeta-Naididae											
Nais elinguis	–	–	–	0.0405	–	–	–	–	–	–	–
Nais pseudobtusa	–	–	–	–	–	0.0004	–	0.0001	–	–	–
Ophidonais serpentina	–	–	0.0001	–	–	–	–	–	–	–	–
Pristina osborni	–	–	–	–	–	0.0003	0.0002	–	–	–	–
Stylaria lacustris	–	–	–	0.0002	–	–	–	–	–	–	–
Annelida-Oligochaeta-Tubificidae											
Ilyodrilus templetoni	–	–	–	–	–	–	–	0.0053	–	0.4365	–
Limnodrilus hoffmeisteri	–	–	–	–	–	–	–	0.0572	0.0319	0.8778	0.0253
Tubificidae, immature	0.0040	–	0.0106	0.0106	0.0067	0.0040	0.0040	–	–	–	–
Annelida-Oligochaeta-Miscellaneous											
(Cernosvitoviella) sp.	–	–	–	–	–	0.0006	–	–	–	–	–
Enchytraeidae C	–	–	–	–	–	–	–	–	–	0.0008	–
Enchytraeidae sp. A	–	–	–	–	–	0.0486	–	0.5833	–	0.0810	–
Enchytraeidae sp. B	–	–	–	–	–	0.0002	–	0.0003	–	–	–
(Lumbricillus) sp.	–	–	–	–	0.0486	0.2592	–	0.1782	–	0.7453	–
Lumbriculidae	–	–	–	0.0486	–	–	–	–	–	0.0486	–
Mollusca-Bivalvia											
Corbicula fluminea	–	–	0.0542	–	–	–	–	–	–	0.0125	–

Table F-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 2/9-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 7 of 9)

Taxonomic Classification	Stations										
	1	2	3	4	5	6	7	8	9	10	11
Mollusca-Gastropoda											
Laevipex sp.	–	–	–	–	–	–	0.0028	–	–	–	–
Arthropoda-Crustacea											
Asellus sp.	–	–	–	–	–	–	–	–	–	0.0010	–
Hyalella azteca	–	–	–	–	–	0.0043	–	–	–	0.0370	–
Arthropoda-Insecta-Chironomidae											
Brillia par	–	–	–	–	–	–	0.0010	–	–	–	–
Chironomus sp.	–	–	–	–	–	–	–	0.0028	–	0.0528	–
Cladotanytarsus sp.	–	–	–	0.0002	–	–	0.0001	–	–	0.0001	–
Corynoneura celeripes	–	–	0.0004	0.0020	0.0001	–	–	–	–	–	–
Near Corynoneura sp. B	0.0006	0.0001	0.0147	–	0.0049	–	–	–	–	–	–
Cricotopus-Orthocladius	0.0037	–	0.0010	2.1559	–	0.0184	0.0330	0.0061	0.0044	0.0119	0.0010
Cryptochironomus fulvus group	–	–	–	0.0035	–	–	0.0008	0.0002	–	0.0006	–
Diamesa sp.	–	–	–	0.0053	–	–	–	–	–	–	0.0005
Dicrotendipes neomodestus	–	–	–	–	–	–	–	0.0012	–	0.3153	–
Eukiefferiella claripennis group	–	–	–	0.0089	–	–	–	–	–	–	–
Eukiefferiella discoloripes group	–	–	–	0.0001	–	–	0.0001	–	–	–	–
Microtendipes sp.	–	–	–	–	–	–	0.0366	–	–	–	–
Nanocladius crassicornus	–	P*	–	–	–	–	–	–	–	–	–
Nilotanypus sp.	–	–	–	0.0014	–	–	–	–	–	–	–
Parakiefferiella sp.	–	–	–	0.0001	–	–	0.0004	–	–	–	–
Parametriocnemus sp. (tent.)	–	–	–	–	–	–	–	–	–	0.0003	–
Paraphaenocladius sp.	–	–	–	–	–	0.0002	–	–	–	–	–

* P = Present with insignificant biomass.

Table F-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 2/9-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 8 of 9)

Taxonomic Classification	Stations										
	1	2	3	4	5	6	7	8	9	10	11
Near Paratendipes	–	–	–	0.0046	–	–	–	–	–	–	–
Polypedilum halterale	–	–	0.0005	0.0108	–	–	0.0007	0.0038	–	0.0001	0.0011
Polypedilum sp.	–	–	–	0.0003	0.0013	–	–	–	–	–	–
Potthastia longimanus	–	–	–	0.0004	–	–	–	–	–	0.0003	–
Rheotanytarsus exiguus group	–	–	0.0005	0.0027	–	–	0.0003	–	0.0003	–	–
Robackia demeijerea	0.0001	–	0.0001	0.0024	–	0.0003	0.0002	–	0.0001	–	–
Smittia aterrima	–	–	–	–	–	–	0.0002	–	–	–	–
Tanytarsus coffmani	–	–	–	0.0039	–	–	–	–	–	–	–
Tanytarsus guerlus group	–	–	–	0.0013	–	–	0.0006	–	–	0.0009	–
Tanytarsus sp.	–	–	–	–	–	–	0.0002	–	–	–	–
Thienemanniella xena	0.0008	–	–	0.0045	–	–	0.0008	–	–	–	–
Tribelos jucundus	–	–	–	–	–	–	–	0.0034	–	0.0026	–
Arthropoda-Insecta-Ephemeroptera											
Baetis sp.	–	–	–	–	0.0015	–	–	–	–	–	–
Ephemerella (Serratella) sp.	–	–	–	0.0168	0.0027	–	0.0266	–	–	–	–
Stenonema annexum	–	–	–	–	–	–	–	–	0.0390	–	–
Arthropoda-Insecta-Trichoptera											
Cheumatopsyche sp.	–	–	–	0.0014	–	–	–	–	0.0004	–	–
Hydropsyche sp.	–	–	–	0.0240	–	–	–	–	–	–	–
Hydroptila sp.	–	–	–	0.0610	–	–	0.0026	–	–	–	–
Arthropoda-Insecta-Miscellaneous											
Brachyptera sp.	–	–	–	–	–	–	0.0078	–	–	–	–
Chrysozona sp.	–	–	–	–	–	–	P*	–	–	–	–
Cordulegaster sp.	–	–	–	–	–	–	0.0495	–	–	–	–

* P = Present with insignificant biomass.

Table F-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 2/9-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 9 of 9)

Taxonomic Classification	Stations										
	1	2	3	4	5	6	7	8	9	10	11
Dasyhelea sp.	–	–	–	–	–	0.0002	–	–	–	0.0[illegible]	–
Dolichopodidae (no larval key)	–	–	–	P*	–	–	–	–	–	–	–
Empididae (no larval kay)	–	–	–	0.0030	–	–	–	–	0.0010	–	–
Ephydridae	–	–	–	0.0376	–	–	–	–	–	–	–
Hastaperla sp.	–	–	–	–	–	–	0.0070	–	–	–	–
Isogenus sp.	–	–	–	0.4416	–	–	–	–	–	–	–
Nemocapnia sp.	0.0015	–	0.0053	–	0.1295	–	–	–	–	–	–
Nemoura sp.	–	–	–	0.0184	–	–	0.0050	–	–	–	–
Octogomphus sp.	–	–	–	–	–	–	0.0825	–	–	–	–
Palpomyia-Sphaeromias	–	–	–	–	–	–	–	–	–	0.0002	–
Antocha sp.	–	–	–	0.0207	–	–	0.0013	–	–	–	–
Simulium sp.	–	–	0.0066	–	–	–	–	–	–	–	–
Stenelmis sp.	–	–	–	0.0525	–	–	0.0315	–	–	–	–
Platyhelminthes-Turbellaria											
Rhabdodocoela	0.0256	0.0005	0.0030	0.0096	0.0126	0.0398	–	0.0003	–	0.0001	–
Turbellaria	–	–	–	–	–	0.0001	–	0.0006	–	0.0011	–
Miscellaneous Invertebrates											
Acari	–	–	–	0.0009	–	–	–	–	–	–	–
Bathyonchus sp.	–	–	–	–	–	P*	–	–	–	–	–
Cryptonchus sp.	–	–	–	P*	–	P*	–	–	–	–	–
Podura aquatica	–	–	–	0.0003	–	–	–	–	–	–	–
Xiphinema sp.	–	–	–	P*	–	P*	–	P*	–	–	–
TOTAL BIOMASS	0.0363	0.0006	0.0970	2.9960	0.2079	0.3766	0.2958	0.8428	0.0809	2.6763	0.0279

* P = Present with insignificant biomass.

Source: WAR, 1981.

Table F-5

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029
BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
DERO DIGITATA	-	-	-	-	-	-	-	-	-	-
NAIDIDAE	-	-	-	-	-	-	-	-	-	-
NAIS BEHNINGI	-	-	-	-	-	-	-	11	-	-
NAIS COMMUNIS	-	-	11	-	-	11	-	11	21	-
NAIS ELINGUIS	-	-	-	-	-	-	-	11	-	-
NAIS PSEUDOBTUSA	-	-	-	-	-	-	-	-	-	-
NAIS SP	-	-	-	-	-	-	-	11	-	-
PRISTINA LONGISOMA	-	11	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	-	32	-	-	-	-	-	-	65	-
PRISTINA SP	-	-	-	-	-	-	-	-	-	-
UNCINAIS UNCINATA	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
AULODRILUS PIGUETI	-	-	-	-	-	-	-	-	-	-
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	-	-	-
LIMNODRILUS HOFFMEISTERI	-	-	-	-	-	-	-	75	65	-
TUBIFICIDAE, IMMATURE	-	-	11	-	-	-	-	-	-	32
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
HAPLOTAXIS SP	-	-	-	-	-	-	-	-	-	-
LUMBRICULIDAE	-	-	-	-	-	-	-	-	-	-
LUMBRICULUS VARIEGATUS	-	-	-	-	-	-	-	-	-	-
LUMBRICILLUS SP	-	-	-	-	11	-	-	11	-	-

Table F-5 (Continued, Page 2 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	-	-	-	-	54	-	-	11	97	183
PELECYPODA (IMMATURE)	-	-	-	-	-	-	-	-	-	-
SPHAERIUM SP	-	-	-	-	21	11	11	65	-	-
PHYLUM MOLLUSCA - CLASS GASTROPODA										
GASTROPODA SP A	-	-	-	-	-	-	-	-	-	-
GYRAULUS SP	-	-	-	-	-	-	-	-	-	-
LAEVIPEX SP	-	-	-	-	-	-	-	-	-	-
PHYSA SP	-	-	-	-	-	-	-	-	-	-
VIVIPARUS SP	-	-	-	-	11	21	11	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
CRANGONYX SP	-	-	-	-	-	-	-	-	-	-
HYALELLA AZTECA	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
ABLABESMYIA MALLOCHI	-	-	-	-	-	-	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
CLADOTANYTARSUS SP	-	-	-	-	-	-	-	-	-	-
CONCHAPELOPIA SP	-	-	-	-	-	-	-	-	-	-
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	-	-	-
CORYNONEURA TARIS	-	-	-	-	-	-	-	11	172	97
NEAR CORYNONEURA SP	-	-	-	-	-	323	-	129	259	43
CRICOTOPUS SP	-	-	-	-	-	-	-	11	-	11
CRYPTOCHIRONOMUS FULVUS	-	-	-	-	-	-	-	-	-	-
CRYPTOCHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
CRYPTOTENDIPES SP	-	-	-	-	-	-	-	-	-	-
DEMICRYPTOCHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-

Table F-5 (Continued, Page 3 of 26)

TAXONOMIC CLASSIFICATION	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
DICROTENDIPES LEUCOSCELIS	-	-	-	-	-	-	-	-	-	-
DICROTENDIPES NERVOSUS	-	-	-	-	-	-	-	-	-	-
DICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
NANOCLADIUS SP	-	-	-	-	-	-	-	-	-	-
NATARSIA SP	-	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	-	-	-	-	-	-	-	-	32	21
PARAKIEFFERIELLA SP	-	-	-	-	-	-	-	-	-	-
PARATENDIPES SP	-	-	-	-	-	-	-	-	-	-
PHAENOPSECTRA SP	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM CONVICTUM	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM FALLAX GROUP	-	-	-	-	-	21	-	-	-	-
POLYPEDILUM HALTERALE	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM ILLINOENSE	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM SCALAENUM	-	-	-	-	-	-	-	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	-	-	-	-
PROCLADIUS SP	-	-	-	-	-	-	-	-	-	-
PSECTROTANYPUS DYARI	-	-	-	-	-	-	-	-	-	-
RHEOCRICOTOPUS SP	-	-	-	-	-	-	-	-	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	-	-	-	-	-	-	-
ROBACKIA DEMEIJERЕA	-	-	-	-	32	75	-	32	194	140
STENOCHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	-	-	-	-	-	-	-
THIENEMANNIELLA XENA	-	-	-	-	-	-	-	-	-	-
TRIAENODES FUSCICORNIS	-	-	-	-	-	-	-	-	-	-
TRIAENODES JUCUNDUS	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
AMELETUS SP	-	-	-	-	-	-	-	-	-	-
NEAR BAETISCA	-	-	-	-	-	-	-	-	-	-
CAENIS SP	-	-	-	-	-	-	-	-	-	-
EPHEMERA SP	-	-	-	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-	-	-	-	-	-	-
STENONEMA SP	-	-	-	-	-	-	-	-	-	-
TRICORYTHODES SP	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	-	-	-	-	-	-	-
GLOSSOSOMATIDAE	-	-	-	-	-	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILA SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILIDAE	-	-	-	-	-	-	-	-	-	-
OECETIS SP	-	-	-	-	-	-	-	-	-	-

Table F-5 (Continued, Page 4 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
UNIDENTIFIED HYDROPSYCHIDAE	-	-	-	-	-	-	-	-	-	-
UNIDENTIFIED TRICHOPTERA	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	-	-	-	-	-
CERATOPOGONIDAE (NO LARVAL KEY)	-	-	-	-	-	-	-	-	-	-
CHAOBORUS SP	-	-	-	-	-	-	-	-	-	-
COLEOPTERA	-	-	-	-	-	-	-	-	-	-
COLLEMBOLA	-	-	-	-	-	-	-	11	11	-
CHENITIS SP	-	-	-	-	-	-	-	-	-	-
ECTOPRIA SP	-	-	-	-	-	-	-	-	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	-	-	-	-	-	-	-
GOMPHIDAE	-	-	-	-	-	-	-	-	-	-
GOMPHUS SP	-	-	-	-	-	-	-	-	-	-
HEXATOMA SP	-	-	-	-	-	-	-	-	-	-
ISOTOMURUS PALUSTRIS	-	-	-	-	-	-	-	-	-	-
LANTHUS SP	-	-	-	-	-	-	-	-	-	-
LIMNIUS LATIUSCULUS	-	-	-	-	-	-	-	-	-	-
OPTIOSERVUS SP	-	-	-	-	-	-	-	-	-	-
PILARIA SP	-	-	-	-	-	-	-	-	-	-
PROGOMPHUS OBSCURUS	-	-	-	-	-	-	-	-	-	-
PROTOPLASA FITCHII	-	-	-	-	-	-	-	-	-	-
RHAGOVELIA SP	-	-	-	-	-	-	-	-	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	-	-	-	-	-	-	-	-
TIPULIDAE	-	-	-	-	-	-	-	-	-	-
TIPULA SP	-	-	-	-	-	-	-	-	-	-
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
PLANARIIDAE	-	-	-	-	-	-	-	-	-	-
RHABDOCOELA	-	108	528	11	11	884	-	657	1013	571

Table F-5 (Continued, Page 5 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 1A	1B	1C	1D	2A	2B	2C	2D	3A	3B
MISCELLANEOUS INVERTEBRATES										
HYDRACARINA SP	-	-	-	-	-	-	-	-	11	-
NEMATA	-	-	-	-	-	-	-	-	21	11
NEUROPTERA	-	-	-	-	-	-	-	11	-	-
[illegible] AQUATICA	-	-	-	-	-	-	-	-	-	-
PROSTOMA RUBRUM	-	-	-	-	-	-	-	-	11	-
TOTAL NUMBER OF ORGANISMS	0	151	550	11	140	1346	22	1068	1972	1109
NUMBER OF TAXA	0	3	3	1	6	7	2	15	13	9

Table F-5 (Continued, Page 6 of 26)

B I O S T A T   V E R S I O N   II

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	3C	3D	4A	4B	4C	4D	5A	5B	5C	5D
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
DERO DIGITATA	-	-	-	-	-	-	-	-	-	-
NAIDIDAE	-	-	-	-	-	-	-	11	-	-
NAIS BEHNINGI	-	-	-	-	11	-	-	-	-	-
NAIS COMMUNIS	-	-	-	-	11	-	-	-	-	-
NAIS ELINGUIS	-	-	-	-	11	-	-	-	-	-
NAIS PSEUDOBTUSA	-	-	-	-	-	-	-	-	-	-
NAIS SP	-	-	-	-	-	-	-	-	-	-
PRISTINA LONGISOMA	-	-	-	43	-	-	-	-	-	-
PRISTINA OSBORNI	-	-	-	-	-	-	-	-	-	-
PRISTINA SP	-	-	-	-	-	-	-	-	-	-
UNCINAIS UNCINATA	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
AULODRILUS PIGUETI	-	-	-	-	-	-	-	-	-	-
ILYODRILUS TEMPLETONI	-	-	86	86	-	-	-	-	-	-
LIMNODRILUS HOFFMEISTERI	-	-	1379	2586	75	1681	-	-	-	-
TUBIFICIDAE, IMMATURE	11	-	-	-	21	-	194	43	54	603
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
HAPLOTAXIS SP	-	-	-	-	-	-	-	-	-	-
LUMBRICULIDAE	-	-	43	-	54	-	162	11	65	431
LUMBRICULUS VARIEGATUS	-	-	-	-	-	21	-	-	-	-
LUMBRICILLUS SP	-	-	-	-	-	-	-	-	-	-

Table F-5 (Continued, Page 7 of 26)

TAXONOMIC CLASSIFICATION	3C	3D	4A	4B	4C	4D	5A	5B	5C	5D
	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	32	118	-	-	-	-	-	-	-	-
PELECYPODA (IMMATURE)	-	-	-	-	-	-	-	11	-	-
SPHAERIUM SP	32	-	-	-	-	-	-	-	-	-
PHYLUM MOLLUSCA - CLASS GASTROPODA										
GASTROPODA SP A	-	-	-	-	-	-	-	-	-	-
GYRAULUS SP	-	-	-	-	-	-	-	-	-	-
LAEVAPEX SP	-	-	-	11	21	11	-	-	-	-
PHYSA SP	-	-	-	-	-	-	-	-	-	-
VIVIPARUS SP	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
CRANGONYX SP	-	-	-	-	-	-	-	-	-	-
HYALELLA AZTECA	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
ABLABESMYIA MALLOCHI	-	-	-	-	-	11	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	11	-	-
CLADOTANYTARSUS SP	-	-	1218	1121	690	32	21	-	-	-
CONCHAPELOPIA SP	-	-	-	-	-	-	-	-	-	-
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	-	-	-
CORYNONEURA TARIS	75	-	-	-	-	-	21	-	-	11
NEAR CORYNONEURA SP	97	65	-	-	-	-	-	-	-	-
CRICOTOPUS SP	-	-	75	-	517	43	86	-	-	-
CRYPTOCHIRONOMUS FULVUS	-	-	981	862	862	140	21	-	-	-
CRYPTOCHIRONOMUS SP	-	-	226	-	-	-	-	-	-	-
CRYPTOTENDIPES SP	-	-	-	86	-	-	-	-	-	-
DEMICRYPTOCHIRONOMUS SP	-	-	-	-	-	11	-	-	-	-

Table F-5 (Continued, Page 8 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 3C	3D	4A	4B	4C	4D	5A	5B	5C	5D
DICROTENDIPES LEUCOSCELIS	-	-	-	-	-	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	75	776	1724	32	65	-	-	-
DICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
NANOCLADIUS SP	-	-	-	-	-	-	-	-	-	-
NATARSIA SP	-	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	11	-	-	-	-	-	21	-	32	21
PARAKIEFFERIELLA SP	-	-	-	-	-	-	-	-	-	-
PARATENDIPES SP	-	-	75	-	-	-	-	-	-	-
PHAENOPSECTRA SP	-	-	-	-	43	-	21	-	-	11
POLYPEDILUM CONVICTUM	-	-	75	259	172	118	-	-	-	-
POLYPEDILUM FALLAX GROUP	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM HALTERALE	-	-	75	-	129	-	21	-	-	21
POLYPEDILUM ILLINOENSE	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM SCALAENUM	-	-	-	3276	560	108	65	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	-	-	-	-
PROCLADIUS SP	-	-	75	-	-	-	-	-	-	-
PSECTROTANYPUS DYARI	-	-	-	-	-	-	-	-	-	-
RHEOCRICOTOPUS SP	-	-	-	-	-	-	-	-	-	11
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	-	-	-	-	-	-	-
ROBACKIA DEMEIJEREA	97	65	-	-	-	-	308	463	86	463
STENOCHIRONOMUS SP	-	-	-	-	-	54	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	603	862	560	54	21	-	-	-
THIENEMANNIELLA XENA	-	-	-	86	-	-	-	-	-	-
TRIBELOS FUSCICORNIS	-	-	-	-	-	-	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
AMELETUS SP	-	-	-	-	-	-	-	-	-	-
NEAR BALTISCA	-	-	-	-	-	-	-	-	-	-
CAENIS SP	-	-	-	-	11	-	-	-	-	-
EPHEMERA SP	-	-	-	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-	-	-	-	-	-	-
STENONEMA SP	-	-	-	-	32	32	-	-	-	-
TRICORYTHODES SP	-	-	-	32	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	-	-	-	-	-	-	11
GLOSSOSOMATIDAE	-	-	-	-	21	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	-	32	-	-	-	-
HYDROPTILA SP	-	-	-	-	75	11	-	-	-	-
HYDROPTILIDAE	-	-	-	-	-	-	-	-	-	-
OECETIS SP	-	-	-	-	32	-	-	-	-	-

Table F-5 (Continued, Page 9 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M²): 3C	3D	4A	4B	4C	4D	5A	5B	5C	5D
UNIDENTIFIED HYDROPSYCHIDAE	-	-	-	32	-	-	-	-	-	-
UNIDENTIFIED TRICHOPTERA	-	-	-	-	-	-	11	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	21	-	-	-	-	-
CERATOPOGONIDAE (NO LARVAL KEY)	-	-	-	-	11	-	32	-	-	32
CHAOBORUS SP	-	11	-	-	-	-	-	-	-	-
COLEOPTERA	-	-	11	-	-	-	-	-	-	-
COLLEMBOLA	-	11	21	-	-	-	-	86	11	32
CRENITIS SP	-	-	-	-	-	-	-	-	-	-
ECTOPRIA SP	-	-	-	-	-	-	-	-	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	-	-	-	-	-	-	-
GOMPHIDAE	-	-	-	-	-	-	-	11	-	-
GOMPHUS SP	-	-	21	-	-	-	-	-	-	-
HEXATOMA SP	-	-	-	-	-	-	-	-	-	-
ISOTOMURUS PALUSTRIS	-	-	-	-	-	-	43	-	-	-
LANTHUS SP	-	-	-	-	-	-	-	-	-	-
LIMNIUS LATIUSCULUS	-	-	-	-	11	-	-	-	-	-
OPTIOSERVUS SP	-	-	-	-	-	-	-	-	-	-
PILARIA SP	-	-	-	-	-	-	-	-	-	-
PROGOMPHUS OBSCURUS	-	-	-	-	-	-	-	-	-	-
PROTOPLASA FITCHII	-	-	-	-	-	-	-	-	-	-
RHAGOVELIA SP	-	-	-	-	-	-	-	-	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	-	-	-	-	-	-	-	-
TIPULIDAE	-	-	-	-	11	-	-	-	-	-
TIPULA SP	-	-	-	-	-	-	-	21	-	-
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
PLANARIIDAE	-	-	-	-	11	-	-	-	-	-
RHABDOCOELA	108	399	21	-	-	-	248	377	75	172

Table F-5 (Continued, Page 10 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 3C	3D	4A	4B	4C	4D	5A	5B	5C	5D
MISCELLANEOUS INVERTEBRATES										
HYDRACARINA SP	-	-	-	21	11	-	-	-	-	-
NEMATA	-	-	-	-	-	-	-	-	-	-
NEUROPTERA	-	-	-	-	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	-	-	-	-	-	-
PROSTOMA RUBRUM	-	-	-	-	32	-	11	-	-	21
TOTAL NUMBER OF ORGANISMS	463	669	5060	10139	5740	2391	1452	1045	323	1840
NUMBER OF TAXA	8	6	17	15	28	15	[illegible]	10	6	13

Table F-5 (Continued, Page 11 of 26)

B I O S T A T   V E R S I O N   II

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	6A	6B	6C	6D	7A	7B	7C	7D	8A	8B
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
DERO DIGITATA	-	-	-	-	-	-	-	-	-	-
NAIDIDAE	-	-	-	-	-	-	-	-	-	-
NAIS BEHNINGI	-	-	-	-	-	-	-	-	-	21
NAIS COMMUNIS	43	-	11	-	-	-	11	-	-	-
NAIS ELINGUIS	-	11	-	-	54	-	32	-	-	54
NAIS PSEUDOBTUSA	-	43	11	108	21	-	-	-	560	-
NAIS SP	21	11	-	-	-	-	-	-	43	11
PRISTINA LONGISOMA	-	-	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	-	-	-	21	-	-	-	-		-
PRISTINA SP	-	-	11	-	-	-	-	-	-	-
UNCINAIS UNCINATA	-	-	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
AULODRILUS PIGUETI	-	-	-	-	-	-	11	-	-	-
ILYODRILUS TEMPLETONI	-	-	-	21	-	-	-	21	-	-
LIMNODRILUS HOFFMEISTERI	-	-	-	194	-	-	-	86	862	-
TUBIFICIDAE, IMMATURE	151	21	32	43	11	11	32	-	215	21
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
HAPLOTAXIS SP	-	-	-	-	-	-	65	-	-	-
LUMBRICULIDAE	129	-	32	-	65	442	162	-	65	377
LUMBRICULUS VARIEGATUS	-	21	11	108	-	-	11	-	43	65
LUMBRICILLUS SP	474	97	108	776	21	-	-	-	1896	118

Table F-5 (Continued, Page 12 of 26)

TAXONOMIC CLASSIFICATION	6A	6B	6C	6D	7A	7B	7C	7D	8A	8B
	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	-	-	-	-	-	-	-	-	-	-
PELECYPODA (IMMATURE)	-	-	-	-	-	-	-	-	-	-
SPHAERIUM SP	-	-	-	-	-	-	-	54	43	-
PHYLUM MOLLUSCA - CLASS GASTROPODA										
GASTROPODA SP A	-	-	-	-	-	-	-	-	-	-
GYRAULUS SP	11	-	-	-	-	-	-	-	-	-
LAEVAPEX SP	-	-	-	-	-	-	-	21	-	11
PHYSA SP	11	-	-	-	-	-	-	-	-	-
VIVIPARUS SP	-	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
CRANGONYX SP	-	-	-	-	-	-	-	-	-	21
HYALELLA AZTECA	-	-	-	-	-	-	-	-	118	21
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
ABLABESMYIA MALLOCHI	-	-	-	-	11	-	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
CLADOTANYTARSUS SP	-	-	-	-	129	345	431	819	21	-
CONCHAPELOPIA SP	-	-	-	-	-	-	-	-	-	-
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	-	-	-
CORYNONEURA TARIS	-	-	-	-	-	-	-	-	-	-
NEAR CORYNONEURA SP	-	-	-	-	-	-	-	-	-	-
CRICOTOPUS SP	-	21	-	32	11	-	172	43	205	312
CRYPTOCHIRONOMUS FULVUS	-	-	-	-	118	172	172	86	-	11
CRYPTOCHIRONOMUS SP	-	-	-	-	-	-	-	21	-	-
CRYPTOTENDIPES SP	-	-	-	-	32	-	-	21	-	-
DEMICRYPTOCHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-

Table F-5 (Continued, Page 13 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 6A	6B	6C	6D	7A	7B	7C	7D	8A	8B
DICROTENDIPES LEUCOSCELIS	-	-	-	-	-	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	-	21	-	43	86	-	-
DICROTENDIPES SP	-	-	-	-	-	-	-	-	11	-
MICROTENDIPES SP	-	-	-	-	11	302	388	172	-	-
NANOCLADIUS SP	-	-	-	-	-	-	86	-	-	-
NATARSIA SP	-	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	-	-	-	-	-	43	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	-	86	-	-	-	-	-
PARATENDIPES SP	-	-	-	-	-	-	-	-	-	-
PHAENOPSECTRA SP	-	-	-	-	-	-	43	-	-	-
POLYPEDILUM CONVICTUM	-	-	-	-	-	1053	948	743	-	-
POLYPEDILUM FALLAX GROUP	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM HALTERALE	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM ILLINOENSE	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM SCALAENUM	-	-	11	43	-	-	-	151	11	-
POTTHASTIA LONGIMANUS	-	-	-	-	11	-	-	-	-	-
PROCLADIUS SP	-	-	-	-	-	-	-	-	-	-
PSECTROTANYPUS DYARI	-	-	-	-	-	-	-	-	-	-
RHEOCRICOTOPUS SP	-	-	-	-	-	-	-	-	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	-	-	-	129	-	-	-
ROBACKIA DEMEIJERCA	43	11	-	-	-	-	43	43	-	-
STENOCHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	-	43	86	86	-	-	-
THIENEMANNIELLA XENA	-	-	-	-	-	-	-	-	-	-
TRIBELOS FUSCICORNIS	-	-	-	-	-	-	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	-	11	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
AMELETUS SP	-	-	-	-	-	-	-	-	-	-
NEAR BAETISCA	-	-	-	-	-	-	-	-	-	-
CAENIS SP	-	-	-	-	-	-	-	-	-	-
EPHEMERA SP	-	-	-	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	11	11	11	-	-	-	-	-	-
STENONEMA SP	-	-	-	-	-	-	-	-	-	-
TRICORYTHODES SP	-	-	-	-	-	-	11	21	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	-	-	-	-	-	43	-	-
GLOSSOSOMATIDAE	-	-	-	-	-	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILA SP	21	-	-	-	-	21	-	11	-	-
HYDROPTILIDAE	-	-	-	-	-	-	-	-	-	-
OECETIS SP	-	-	-	-	-	118	420	129	-	-

Table F-5 (Continued, Page 14 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 6A	6B	6C	6D	7A	7B	7C	7D	8A	8B
UNIDENTIFIED HYDROPSYCHIDAE	-	-	-	-	-	-	129	-	-	-
UNIDENTIFIED TRICHOPTERA	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	-	-	-	-	-
CERATOPOGONIDAE (NO LARVAL KEY)	32	11	32	-	11	21	-	-	21	-
CHAOBORUS SP	-	-	-	-	-	-	-	-	-	-
COLEOPTERA	-	-	-	-	-	-	-	11	-	-
COLLEMBOLA	-	-	-	-	-	-	-	-	-	-
CRENITIS SP	-	-	-	-	-	-	-	-	-	-
ECTOPRIA SP	-	-	-	-	-	-	-	-	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	-	-	-	11	11	11	-	-
GOMPHIDAE	-	-	-	-	-	-	-	-	-	-
GOMPHUS SP	-	-	-	-	-	-	-	-	-	-
HEXATOMA SP	-	-	-	-	-	-	-	11	11	-
ISOTOMURUS PALUSTRIS	-	-	-	-	-	-	-	-	-	-
LANTHUS SP	-	-	-	-	-	-	11	-	-	-
LIMNIUS LATIUSCULUS	-	-	-	-	-	-	-	-	-	-
OPTIOSERVUS SP	-	-	-	-	-	-	-	11	-	-
PILARIA SP	-	-	-	-	-	-	-	-	-	-
PROGOMPHUS OBSCURUS	-	-	-	-	11	65	32	32	-	-
PROTOPLASA FITCHII	-	-	-	-	-	-	11	-	-	-
RHAGOVELIA SP	-	-	-	-	-	-	-	-	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	-	-	-	32	11	-	-	-
TIPULIDAE	-	-	-	-	-	-	-	-	-	-
TIPULA SP	-	-	-	-	-	-	-	-	-	-
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
PLANARIIDAE	-	-	-	-	-	-	-	-	-	32
RHABDOCOELA	215	226	162	32	-	-	248	32	43	-

Table F-5 (Continued, Page 15 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 6A	6B	6C	6D	7A	7B	7C	7D	8A	8B
MISCELLANEOUS INVERTEBRATES										
HYDRACARINA SP	-	-	-	-	21	32	32	-	-	-
NEMATA	-	11	43	11	11	32	21	-	-	97
NEUROPTERA	-	-	-	-	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	-	-	-	-	-	-
PROSTOMA RUBRUM	-	-	-	-	21	-	11	-	-	-
TOTAL NUMBER OF ORGANISMS	1151	495	475	1400	720	3586	3013	2679	4179	1172
NUMBER OF TAXA	11	12	12	12	20	16	30	24	17	14

Table F-5 (Continued, Page 16 of 26)

BIOSTAT VERSION II

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M): 8C	8D	9A	9B	9C	9D	10A	10B	10C	10D
PHYLUM ANNELIDA - CLASS OLIGOCHAETA										
ANNELIDA - OLIGOCHAETA - NAIDIDAE										
DERO DIGITATA	-	-	-	-	-	-	-	-	-	-
NAIDIDAE	-	-	-	-	-	-	-	-	-	-
NAIS BEHNINGI	-	-	-	-	-	-	-	-	-	-
NAIS COMMUNIS	-	-	-	32	-	-	-	-	-	-
NAIS ELINGUIS	-	-	-	-	-	-	-	-	-	-
NAIS PSEUDOBTUSA	2435	-	21	21	54	-	-	-	-	-
NAIS SP	-	11	-	11	-	-	-	-	11	-
PRISTINA LONGISOMA	-	-	-	-	-	-	-	-	-	-
PRISTINA OSBORNI	-	11	-	-	11	-	-	-	-	-
PRISTINA SP	-	-	-	-	-	-	-	-	-	-
UNCINAIS UNCINATA	-	65	-	-	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE										
AULODRILUS PIGUETI	-	-	-	-	-	-	-	-	-	-
ILYODRILUS TEMPLETONI	-	-	-	-	-	-	-	-	-	-
LIMNODRILUS HOFFMEISTERI	75	21	43	162	582	571	-	-	-	11
TUBIFICIDAE, IMMATURE	-	32	21	21	-	-	-	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS										
HAPLOTAXIS SP	-	-	-	-	-	-	-	-	-	-
LUMBRICULIDAE	172	21	840	54	-	-	-	11	-	32
LUMBRICULUS VARIEGATUS	43	-	21	-	-	-	-	-	-	-
LUMBRICILLUS SP	9892	65	-	-	-	-	11	-	-	-

Table F-5 (Continued, Page 17 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 8C	8D	9A	9B	9C	9D	10A	10B	10C	10D
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	-	-	-	-	-	-	-	-	-	-
PELECYPODA (IMMATURE)	-	-	-	-	-	-	-	-	-	-
SPHAERIUM SP	-	-	43	11	32	-	11	-	-	-
PHYLUM MOLLUSCA - CLASS GASTROPODA										
GASTROPODA SP A	-	-	-	11	-	-	-	-	-	-
GYRAULUS SP	-	-	-	-	-	-	-	-	-	-
LAEVAPEX SP	-	-	-	-	-	-	-	-	-	-
PHYSA SP	-	-	-	-	-	-	-	-	-	-
VIVIPARUS SP	-	11	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
CRANGONYX SP	-	-	-	-	-	-	-	-	-	-
HYALELLA AZTECA	11	-	-	-	-	-	-	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
ABLABESMYIA MALLOCHI	-	-	-	-	-	-	-	-	-	-
CHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
CLADOTANYTARSUS SP	-	-	-	-	21	21	-	-	-	-
CONCHAPELOPIA SP	-	-	-	-	-	-	-	-	-	-
CORYNONEURA CELERIPES	-	-	-	21	-	21	-	-	-	-
CORYNONEURA TARIS	-	-	-	-	-	-	-	-	-	-
NEAR CORYNONEURA SP	-	-	-	-	-	-	-	-	-	-
CRICOTOPUS SP	463	11	21	65	43	21	-	11	-	-
CRYPTOCHIRONOMUS FULVUS	-	-	97	108	129	108	-	-	-	-
CRYPTOCHIRONOMUS SP	-	-	11	21	-	-	-	-	-	-
CRYPTOTENDIPES SP	-	-	11	21	-	-	-	-	-	-
DEMICRYPTOCHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-

Table F-5 (Continued, Page 18 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 8C	8D	9A	9B	9C	9D	10A	10B	10C	10D
DICROTENDIPES LEUCOSCELIS	11	-	-	-	-	-	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	-	-	-	-	-	-	11
DICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	-	-	-	-
NANOCLADIUS SP	-	-	-	-	-	-	-	-	-	-
NATARSIA SP	-	-	-	-	-	-	-	-	-	-
NILOTANYPUS SP	-	-	-	-	-	-	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	-	-	21	-	-	-	-
PARATENDIPES SP	-	-	-	21	-	-	-	-	-	-
PHAENOPSECTRA SP	11	-	-	-	-	-	-	-	-	-
POLYPEDILUM CONVICTUM	-	-	-	200	65	129	-	-	-	-
POLYPEDILUM FALLAX GROUP	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM HALTERALE	-	11	-	-	-	-	-	-	-	-
POLYPEDILUM ILLINOENSE	-	-	-	-	-	-	-	-	-	-
POLYPEDILUM SCALAENUM	-	-	-	-	65	129	-	-	-	-
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	-	-	-	-
PROCLADIUS SP	-	-	-	-	-	-	-	-	-	-
PSECTROTANYPUS DYARI	-	-	-	-	-	-	-	-	-	-
RHEOCRICOTOPUS SP	-	-	43	21	86	43	-	-	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	75	86	65	21	-	-	-	-
ROBACKIA DEMEIJEREA	-	32	140	109	172	603	11	-	-	-
STENOCHIRONOMUS SP	-	-	-	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	140	690	345	345	-	-	-	-
THIENEMANNIELLA XENA	-	-	-	43	-	-	-	-	-	-
TRIBELOS FUSCICORNIS	-	-	-	-	-	21	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA										
AMELETUS SP	-	-	32	-	-	-	-	-	-	-
NEAR BAETISCA	-	-	21	11	-	-	-	-	-	-
CAENIS SP	-	-	-	-	-	-	-	-	-	-
EPHEMERA SP	-	-	11	-	-	-	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-	-	-	-	-	-	-
STENONEMA SP	-	-	-	11	-	-	-	-	-	-
TRICORYTHODES SP	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA										
CHEUMATOPSYCHE SP	-	-	86	86	-	32	-	-	-	-
GLOSSOSOMATIDAE	-	-	-	-	-	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILA SP	-	-	-	-	-	-	-	-	-	-
HYDROPTILIDAE	-	-	-	-	-	-	-	-	11	-
OECETIS SP	-	-	-	-	11	-	-	-	-	-

Table F-5 (Continued, Page 19 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 8C	8D	9A	9B	9C	9D	10A	10B	10C	10D
UNIDENTIFIED HYDROPSYCHIDAE	-	-	-	-	43	-	-	-	-	-
UNIDENTIFIED TRICHOPTERA	-	-	-	-	-	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-	-	-	-	-	-	-
CERATOPOGONIDAE (NO LARVAL KEY)	-	-	-	-	-	-	-	-	-	-
CHAOBORUS SP	-	-	-	-	-	-	-	-	-	-
COLEOPTERA	-	-	-	-	-	-	-	-	-	-
COLLEMBOLA	-	-	-	-	-	-	-	-	11	-
CRENITIS SP	-	-	-	-	-	-	-	-	-	-
ECTOPRIA SP	-	-	-	-	-	-	-	-	-	-
EMPIDIDAE (NO LARVAL KEY)	-	-	43	32	21	-	-	-	-	-
GOMPHIDAE	-	-	-	-	-	-	-	-	-	-
GOMPHUS SP	-	-	-	-	-	-	-	-	-	-
HEXATOMA SP	-	-	-	-	-	-	-	-	-	-
ISOTOMURUS PALUSTRIS	-	-	-	-	-	-	-	-	-	-
LANTHUS SP	-	-	-	-	-	-	-	-	-	-
LIMNIUS LATIUSCULUS	-	-	-	-	-	-	-	-	-	-
OPTIOSERVUS SP	-	-	-	-	-	-	-	-	-	-
PILARIA SP	-	-	-	-	-	-	-	-	-	-
PROGOMPHUS OBSCURUS	-	-	-	-	-	-	-	-	-	-
PROTEOPLASA FITCHII	-	-	32	-	-	-	-	-	-	-
RHAGOVELIA SP	-	-	11	-	-	-	-	-	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-
STENELMIS SP	-	-	-	-	-	-	-	-	-	-
TIPULIDAE	-	-	-	11	-	-	-	-	-	-
TIPULA SP	-	-	-	-	-	-	-	-	-	-
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
PLANARIIDAE	11	-	-	-	-	-	-	-	-	-
RHABDOCOELA	-	-	21	-	11	-	11	11	21	-

Table F-5 (Continued, Page 20 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	8C	8D	9A	9B	9C	9D	10A	10B	10C	10D
MISCELLANEOUS INVERTEBRATES										
HYDRACARINA SP	43	-	43	11	-	-	-	-	-	-
NEMATA	21	11	-	21	11	21	-	-	-	11
NEUROPTERA	-	-	-	-	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	-	11	-	-	-	-
PROSTOMA RUBRUM	-	11	108	-	21	11	-	-	-	-
TOTAL NUMBER OF ORGANISMS	13188	313	1935	1991	1788	2120	44	33	54	65
NUMBER OF TAXA	12	13	24	27	19	17	4	3	4	4

Table F-5 (Continued, Page 21 of 26)

B I O S T A T   V E R S I O N   II

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 11A	11B	11C	11D
PHYLUM ANNELIDA - CLASS OLIGOCHAETA				
ANNELIDA - OLIGOCHAETA - NAIDIDAE				
DERO DIGITATA	86	-	-	-
NAIDIDAE	-	-	-	-
NAIS BEHNINGI	-	-	-	-
NAIS COMMUNIS	-	-	-	-
NAIS ELINGUIS	-	-	-	-
NAIS PSEUDOBTUSA	-	-	-	-
NAIS SP	-	-	-	-
PRISTINA LONGISOMA	-	-	-	-
PRISTINA OSBORNI	-	-	-	-
PRISTINA SP	-	-	-	-
UNCINAIS UNCINATA	-	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE				
AULODRILUS PIGUETI	-	-	-	-
ILYODRILUS TEMPLETONI	-	-	-	-
LIMNODRILUS HOFFMEISTERI	5034	22144	6821	835[illegible]
TUBIFICIDAE, IMMATURE	-	-	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS				
HAPLOTAXIS SP	-	-	-	-
LUMBRICULIDAE	-	129	75	97
LUMBRICULUS VARIEGATUS	-	-	-	-
LUMBRICILLUS SP	-	-	-	-

Table F-5 (Continued, Page 22 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 11A	11B	11C	11D						
PHYLUM MOLLUSCA										
PHYLUM MOLLUSCA - CLASS PELECYPODA										
CORBICULA FLUMINEA	-	-	-	-						
PELECYPODA (IMMATURE)	-	-	-	-						
SPHAERIUM SP	-	-	11	-						
PHYLUM MOLLUSCA - CLASS GASTROPODA										
GASTROPODA SP A	-	-	-	-						
GYRAULUS SP	-	-	-	-						
LAEVAPEX SP	-	-	-	-						
PHYSA SP	-	-	-	-						
VIVIPARUS SP	-	-	-	-						
PHYLUM ARTHROPODA										
PHYLUM ARTHROPODA - CLASS CRUSTACEA										
CRANGONYX SP	-	-	-	-						
HYALELLA AZTECA	-	-	-	-						
PHYLUM ARTHROPODA - CLASS INSECTA										
ARTHROPODA - INSECTA - CHIRONOMIDAE										
AELABESMYIA MALLOCHI	-	-	-	-						
CHIRONOMUS SP	86	21	43	75						
CLADOTANYTARSUS SP	-	-	-	-						
CONCHAPELOPIA SP	21	21	21	11						
CORYNONEURA CELERIPES	-	-	-	-						
CORYNONEURA TARIS	-	-	-	-						
NEAR CORYNONEURA SP	-	-	-	-						
CRICOTOPUS SP	-	-	-	11						
CRYPTOCHIRONOMUS FULVUS	32	11	-	11						
CRYPTOCHIRONOMUS SP	-	-	-	-						
CRYPTOTENDIPES SP	-	-	-	-						
DEMICRYPTOCHIRONOMUS SP	-	-	-	-						

Table F-5 (Continued, Page 23 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO./SQ M): 11A	11B	11C	11D
DICROTENDIPES LEUCOSCELIS	-	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	-
DICROTENDIPES SP	-	-	-	-
MICROTENDIPES SP	-	-	-	-
NANOCLADIUS SP	-	-	-	-
NATARSIA SP	21	-	11	21
NILOTANYPUS SP	-	-	-	-
PARAKIEFFERIELLA SP	32	21	32	11
PARATENDIPES SP	-	-	-	-
PHAENOPSECTRA SP	-	-	-	-
POLYPEDILUM CONVICTUM	-	-	-	-
POLYPEDILUM FALLAX GROUP	-	-	-	-
POLYPEDILUM HALTERALE	-	-	-	-
POLYPEDILUM ILLINOENSE	11	-	-	-
POLYPEDILUM SCALAENUM	269	442	103	302
POTTHASTIA LONGIMANUS	-	-	-	-
PROCLADIUS SP	11	-	-	-
PSECTROTANYPUS DYARI	215	32	151	86
RHEOCRICOTOPUS SP	-	-	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	-
ROBACKIA DEMEIJEREI	11	-	-	-
STENOCHIRONOMUS SP	-	-	-	-
TANYTARSUS GUERLUS GROUP	11	-	11	-
THIENEMANNIELLA XENA	-	-	-	-
TRIBELOS FUSCICORNIS	-	-	-	-
TRIBELOS JUCUNDUS	-	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA				
AMELETUS SP	-	-	-	-
NEAR BAETISCA	-	-	-	-
CAENIS SP	-	-	-	-
EPHEMERA SP	-	-	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-
STENONEMA SP	-	-	-	-
TRICORYTHODES SP	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA				
CHEUMATOPSYCHE SP	-	-	-	-
GLOSSOSOMATIDAE	-	-	-	-
HYDROPSYCHE SP	11	-	-	-
HYDROPTILA SP	-	-	-	-
HYDROPTILIDAE	-	-	-	-
OECETIS SP	-	-	-	-

Table F-5 (Continued, Page 24 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	11A	11B	11C	11D						
UNIDENTIFIED HYDROPSYCHIDAE	-	-	-	-						
UNIDENTIFIED TRICHOPTERA	-	-	-	-						
ARTHROPODA - INSECTA - MISCELLANEOUS										
ANTOCHA SP	-	-	-	-						
CERATOPOGONIDAE (NO LARVAL KEY)	11	11	-	11						
CHAOBORUS SP	215	269	118	237						
COLEOPTERA	-	-	-	-						
COLLEMBOLA	-	-	-	-						
CRENITIS SP	-	-	-	11						
ECTOPRIA SP	11	-	-	-						
EMPIDIDAE (NO LARVAL KEY)	-	-	-	-						
GOMPHIDAE	-	-	-	-						
GOMPHUS SP	-	-	-	-						
HEXATOMA SP	11	-	-	-						
ISOTOMURUS PALUSTRIS	-	-	-	-						
LANTHUS SP	-	-	-	-						
LIMNIUS LATIUSCULUS	-	-	-	-						
OPTIOSERVUS SP	-	-	-	-						
PILARIA SP	32	21	21	21						
PROGOMPHUS OBSCURUS	21	-	-	-						
PHOTOPLASA FITCHII	-	-	-	-						
RHAGOVELIA SP	-	-	-	-						
SIMULIUM SP	11	11	-	-						
STENELMIS SP	-	-	-	-						
TIPULIDAE	-	-	-	-						
TIPULA SP	-	-	-	-						
PHYLUM PLATYHELMINTHES										
PHYLUM PLATYHELMINTHES - TURBELLARIA										
PLANARIIDAE	-	-	-	-						
RHABDOCOELA	-	-	-	-						

Table F-5 (Continued, Page 25 of 26)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M):									
	11A	11B	11C	11D						
MISCELLANEOUS INVERTEBRATES										
HYDRACARINA SP	-	-	-	-	******	******	******	******	******	******
NEMATA	11	21	-	-	******	******	******	******	******	******
NEUROPTERA	-	-	-	-	******	******	******	******	******	******
POLYPHA AQUATICA	-	-	-	-	******	******	******	******	******	******
PROSTOMA RUBRUM	-	-	-	-	******	******	******	******	******	******
TOTAL NUMBER OF ORGANISMS	7174	23154	7498	9256	******	******	******	******	******	******
NUMBER OF TAXA	22	13	12	14	******	******	******	******	******	******

Table F-5 (Continued, Page 26 of 26)

SHANNON - WEAVER SPECIES DIVERSITY INDEX

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

STATION	MAGNITUDE
1A	0.0
1B	1.095
1C	0.282
1D	0.0
2A	2.292
2B	1.425
2C	1.000
2D	2.146
3A	2.414
3B	2.176
3C	2.643
3D	1.735
4A	2.847
4B	2.694
4C	3.221
4D	1.900
5A	3.325
5B	1.396
5C	2.391
5D	2.433
6A	2.555
6B	2.598
6C	2.870
6D	2.287
7A	3.755
7B	2.793
7C	3.782
7D	3.203
8A	2.487
8B	2.849
8C	1.159
8D	3.326
9A	3.302
9B	3.528
9C	3.237
9D	2.902
10A	2.005
10B	1.565
10C	1.933
10D	1.835
11A	1.166
11B	0.762
11C	0.694
11D	0.727

Table F-6

RICHARD B. RUSSELL PREIMPOUNDMENT STUDY - CONTRACT NO. DACW21-81-C-0029

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

PASS TWO - CODED DATA USED/STATIONS COLLAPSED

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 1	2	3	4	5	6	7	8	9	10	11
PHYLUM ANNELIDA - CLASS OLIGOCHAETA											
ANNELIDA - OLIGOCHAETA - NAIDIDAE											
DERO DIGITATA	-	-	-	-	-	-	-	-	-	-	21
NAIDIDAE	-	-	-	-	3	-	-	-	-	-	-
NAIS BEHNINGI	-	3	-	3	-	-	-	5	-	-	-
NAIS COMMUNIS	-	-	-	3	-	13	3	-	8	-	-
NAIS ELINGUIS	3	5	5	3	-	3	22	13	-	-	-
NAIS PSEUDOBTUSA	-	3	-	-	-	40	5	749	24	-	-
NAIS SP	-	3	-	-	-	9	-	16	3	3	-
PRISTINA LONGISOMA	3	-	-	11	-	-	-	-	-	-	-
PRISTINA OSBORNI	6	-	16	-	-	5	-	3	3	-	-
PRISTINA SP	-	-	-	-	-	3	-	-	-	-	-
UNCINAIS UNCINATA	-	-	-	-	-	-	-	16	-	-	-
ANNELIDA - OLIGOCHAETA - TUBIFICIDAE											
AULODRILUS PIGUETI	-	-	-	-	-	-	3	-	-	-	-
ILYODRILUS TEMPLETONI	-	-	-	43	-	5	5	-	-	-	-
LIMNODRILUS HOFFMEISTERI	-	19	16	1430	-	49	21	240	339	3	10838
TUBIFICIDAE, IMMATURE	3	-	11	5	224	62	13	67	11	-	-
ANNELIDA - OLIGOCHAETA -MISCELLANEOUS											
HAPLOTAXIS SP	-	-	-	-	-	-	16	-	-	-	-
LUMBRICULIDAE	-	-	-	24	167	40	167	159	224	11	75
LUMBRICULUS VARIEGATUS	-	-	-	5	-	35	3	39	5	-	-
LUMBRICILLUS SP	-	5	-	-	-	364	5	2993	-	3	-

Table F-6 (Continued, Page 2 of 12)

TAXONOMIC CLASSIFICATION	1	2	3	4	5	6	7	8	9	10	11
	NUMBER OF ORGANISMS AT STATION (NO /SQ M):										
PHYLUM MOLLUSCA											
PHYLUM MOLLUSCA - CLASS PELECYPODA											
CORBICULA FLUMINEA	-	16	108	-	-	-	-	-	-	-	-
PELECYPODA (IMMATURE)	-	-	-	-	3	-	-	-	-	-	-
SPHAERIUM SP	-	27	8	-	-	-	13	11	22	3	3
PHYLUM MOLLUSCA - CLASS GASTROPODA											
GASTROPODA SP A	-	-	-	-	-	-	-	-	3	-	-
GYRAULUS SP	-	-	-	-	-	3	-	-	-	-	-
LAEVAPEX SP	-	-	-	11	-	-	5	3	-	-	-
PHYSA SP	-	-	-	-	-	3	-	-	-	-	-
VIVIPARUS SP	-	11	-	-	-	-	-	3	-	-	-
PHYLUM ARTHROPODA											
PHYLUM ARTHROPODA - CLASS CRUSTACEA											
CRANGONYX SP	-	-	-	-	-	-	-	5	-	-	-
HYALELLA AZTECA	-	-	-	-	-	-	-	38	-	-	-
PHYLUM ARTHROPODA - CLASS INSECTA											
ARTHROPODA - INSECTA - CHIRONOMIDAE											
ABLABESMYIA MALLOCHI	-	-	-	3	-	-	3	-	-	-	-
CHIRONOMUS SP		-	-	-	3	-	-	-	-	-	57
CLADOTANYTARSUS SP		-	-	765	5	-	431	5	11	-	-
CONCHAPELOPIA SP	-	-	-	-	-	-	-	-	-	-	19
CORYNONEURA CELERIPES	-	-	-	-	-	-	-	-	11	-	-
CORYNONEURA TARIS	-	3	86	-	8	-	-	-	-	-	-
NEAR CORYNONEURA SP	-	113	116	-	-	-	-	-	-	-	-
CRICOTOPUS SP	-	3	3	159	21	13	57	248	38	3	3
CRYPTOCHIRONOMUS FULVUS	-	-	-	711	5	-	137	3	110	-	13
CRYPTOCHIRONOMUS SP	-	-	-	57	-	-	5	-	8	-	-
CRYPTOTENDIPES SP	-	-	-	21	-	-	13	-	8	-	-
DEMICRYPTOCHIRONOMUS SP	-	-	-	3	-	-	-	-	-	-	-

Table F-6 (Continued, Page 3 of 12)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO./SQ M) 1	2	3	4	5	6	7	8	9	10	11
DICROTENDIPES LEUCOSCELIS	-	-	-	-	-	-	-	3	-	-	-
DICROTENDIPES NEOMODESTUS	-	-	-	652	16	-	39	-	-	3	-
DICROTENDIPES SP	-	-	-	-	-	-	-	3	-	-	-
MICROTENDIPES SP	-	-	-	-	-	-	218	-	-	-	-
NANOCLADIUS SP	-	-	-	-	-	-	21	-	-	-	-
NATARSIA SP	-	-	-	-	-	-	-	-	-	-	13
NILOTANYPUS SP	-	-	16	-	19	-	11	-	-	-	-
PARAKIEFFERIELLA SP	-	-	-	-	-	-	21	-	5	-	24
PARATENDIPES SP	-	-	-	19	-	-	-	-	5	-	-
PHAENOPSECTRA SP	-	-	-	11	8	-	11	3	-	-	-
POLYPEDILUM CONVICTUM	-	-	-	156	-	-	846	-	110	-	-
POLYPEDILUM FALLAX GROUP	-	5	-	-	-	-	-	-	-	-	-
POLYPEDILUM HALTERALE	-	-	-	51	11	-	-	3	-	-	-
POLYPEDILUM ILLINOENSE	-	-	-	-	-	-	-	-	-	-	3
POLYPEDILUM SCALAENUM	-	-	-	986	16	13	39	3	48	-	299
POTTHASTIA LONGIMANUS	-	-	-	-	-	-	3	-	-	-	-
PROCLADIUS SP	-	-	-	19	-	-	-	-	-	-	3
PSECTROTANYPUS DYARI	-	-	-	-	-	-	-	-	-	-	121
RHEOCRICOTOPUS SP	-	-	-	-	3	-	-	-	48	-	-
RHEOTANYTARSUS EXIGUUS GROUP	-	-	-	-	-	-	32	-	62	-	-
ROBACKIA DEMEIJEREI	-	35	124	-	350	13	22	8	256	3	3
STENOCHIRONOMUS SP	-	-	-	13	-	-	-	-	-	-	-
TANYTARSUS GUERLUS GROUP	-	-	-	520	5	-	54	-	380	-	5
THIENEMANNIELLA XENA	-	-	-	21	-	-	-	-	11	-	-
TRIBELOS FUSCICORNIS	-	-	-	-	-	-	-	-	5	-	-
TRIBELOS JUCUNDUS	-	-	-	-	-	-	-	3	-	-	-
ARTHROPODA - INSECTA - EPHEMEROPTERA											
AMELETUS SP	-	-	-	-	-	-	-	-	8	-	-
NEAR BAETISCA	-	-	-	-	-	-	-	-	8	-	-
CAENIS SP	-	-	-	3	-	-	-	-	-	-	-
EPHEMERA SP	-	-	-	-	-	-	-	-	3	-	-
EPHEMERELLA (SERRATELLA) SP	-	-	-	-	-	8	-	-	-	-	-
STENONEMA SP	-	-	-	16	-	-	-	-	3	-	-
TRICORYTHODES SP	-	-	-	8	-	-	8	-	-	-	-
ARTHROPODA - INSECTA - TRICHOPTERA											
CHEUMATOPSYCHE SP	-	-	-	-	3	-	11	-	51	-	-
GLOSSOSOMATIDAE	-	-	-	5	-	-	-	-	-	-	-
HYDROPSYCHE SP	-	-	-	8	-	-	-	-	-	-	3

Table F-6 (Continued, Page 4 of 12)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /SQ M): 1	2	3	4	5	6	7	8	9	10	11
HYDROPTILA SP	-	-	-	22	-	5	8	-	-	-	-
HYDROPTILIDAE	-	-	-	-	-	-	-	-	-	3	-
OECETIS SP	-	-	-	8	-	-	167	-	3	-	-
UNIDENTIFIED HYDROPSYCHIDAE	-	-	-	8	-	-	32	-	11	-	-
UNIDENTIFIED TRICHOPTERA	-	-	-	-	3	-	-	-	-	-	-
ARTHROPODA - INSECTA - MISCELLANEOUS											
ANTOCHA SP	-	-	-	5	-	-	-	-	-	-	-
CERATOPOGONIDAE (NO LARVAL KEY)	-	-	-	3	16	19	8	5	-	-	8
CHAOBORUS SP	-	-	3	-	-	-	-	-	-	-	210
COLEOPTERA	-	-	-	3	-	-	3	-	-	-	-
COLLEMBOLA	-	3	5	5	32	-	-	-	-	3	-
CHENITIS SP	-	-	-	-	-	-	-	-	-	-	3
ECTOPRIA SP	-	-	-	-	-	-	-	-	-	-	3
EMPIDIDAE (NO LARVAL KEY)	-	-	-	-	-	-	8	-	24	-	-
GOMPHIDAE	-	-	-	-	3	-	-	-	-	-	-
GOMPHUS SP	-	-	-	5	-	-	3	3	-	-	-
HEXATOMA SP	-	-	-	-	-	-	-	-	-	-	3
ISOTOMURUS PALUSTRIS	-	-	-	-	11	-	-	-	-	-	-
LANTHUS SP	-	-	-	-	-	-	3	-	-	-	-
LIMNIUS LATIUSCULUS	-	-	-	3	-	-	-	-	-	-	-
OPTIOSERVUS SP	-	-	-	-	-	-	3	-	-	-	-
PILARIA SP	-	-	-	-	-	-	-	-	-	-	24
PHOJCRPHUS OBSCURUS	-	-	-	-	-	-	35	-	-	-	5
PROTOPLASA FITCHII	-	-	-	-	-	-	3	-	8	-	-
RHAGOVELIA SP	-	-	-	-	-	-	-	-	3	-	-
SIMULIUM SP	-	-	-	-	-	-	-	-	-	-	5
STENELMIS SP	-	-	-	-	-	-	11	-	-	-	-
TIPULIDAE	-	-	-	3	-	-	-	-	3	-	-
TIPULA SP	-	-	-	-	5	-	-	-	-	-	-
PHYLUM PLATYHELMINTHES											
PHYLUM PLATYHELMINTHES - TURBELLARIA											
PLANARIIDAE	-	-	-	3	-	-	-	11	-	-	-
RHABDOCOELA	162	300	523	5	218	159	70	11	8	11	-

Table F-6 (Continued, Page 5 of 12)

TAXONOMIC CLASSIFICATION	NUMBER OF ORGANISMS AT STATION (NO /50 M):										
	1	2	3	4	5	6	7	8	9	10	11
MISCELLANEOUS INVERTEBRATES											
HYDRACARINA SP	-	-	3	8	-	-	22	11	13	-	-
NEMATA	-	-	8	-	-	16	16	32	13	3	8
NEUROPTERA	-	3	-	-	-	-	-	-	-	-	-
PODURA AQUATICA	-	-	-	-	-	-	-	-	3	-	-
PROSTOMA RUBRUM	-	-	3	8	8	-	8	3	35	-	-
TOTAL NUMBER OF ORGANISMS	179	645	1054	5834	1166	878	2701	4717	1963	52	11772
NUMBER OF TAXA	5	17	17	46	26	22	49	33	42	12	26

Table F-6 (Continued, Page 6 of 12)

SHANNON - WEAVER SPECIES DIVERSITY INDEX

BENTHIC DATA - SAVANNAH RIVER - COLLECTED 7/13-15/81

STATION	MAGNITUDE
1	0.627
2	2.099
3	2.467
4	3.278
5	2.995
6	3.011
7	3.709
8	1.992
9	3.863
10	3.322
11	0.645

Table F-6. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 7 of 12)

Taxonomic Classification	Stations 1	2	3	4	5	6	7	8	9	10	11
Annelida-Oligochaeta-Naididae											
Dero digitata	–	–	–	–	–	–	–	–	–	–	0.0008
Naididae	–	–	–	–	0.0001	–	–	–	–	–	–
Nais behningi	–	0.0001	–	0.0001	–	–	–	0.0002	–	–	–
Nais communis	–	–	–	0.0001	–	0.0005	0.0001	–	0.0003	–	–
Nais elinguis	0.0001	0.0002	0.0002	0.0001	–	0.0001	0.0008	0.0005	–	–	–
Nais pseudobtusa	–	0.0001	–	–	–	0.0015	0.0002	0.0277	0.0009	–	–
Nais sp.	–	0.0001	–	–	–	0.0003	–	0.0006	0.0001	0.0001	
Pristina longisoma	0.0001	–	–	0.0004	–	–	–	–	–	–	–
Pristina osborni	0.0003	–	0.0006	–	–	0.0002	–	0.0001	0.0001	–	–
Pristina sp.	–	–	–	–	–	0.0001	–	–	–	–	–
Uncinais uncinata	–	–	–	–	–	–	–	0.0006	–	–	–
Annelida-Oligochaeta-Tubificidae											
Aulodrilus pigueti	–	–	–	–	–	–	0.0008	–	–	–	–
Ilyodrilus templetoni	–	–	–	0.0120	–	0.0014	0.0014	–	–	–	–
Limnodrilus hoffmeisteri	–	0.0053	0.0045	0.3990	–	0.0134	0.0059	0.0670	0.0946	0.0008	3.0238
Tubificidae, immature	0.0008	–	0.0031	0.0014	0.0625	0.0173	0.0036	0.0187	0.0031	–	–
Annelida-Oligochaeta-Miscellaneous											
Haplotaxis sp.	–	–	–	–	–	–	0.0011	–	–	–	–
Lumbriculidae	–	–	–	0.3889	2.7059	0.6481	2.7059	2.5763	3.6295	0.1782	1.2152
Lumbriculus variegatus	–	–	–	0.0810	–	0.5671	0.0486	0.6157	0.0810	–	–
(Lumbricillus sp.)	–	0.0004	–	–	–	0.0258	0.0004	0.2125	–	0.0002	–

Table F-6. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 8 of 12)

Taxonomic Classification	Stations										
	1	2	3	4	5	6	7	8	9	10	11
Mollusca-Pelecypoda											
Corbicula fluminea	–	2.1979	14.8360	–	–	–	–	–	–	–	–
Pelecypoda (immature)	–	–	–	–	0.0048	–	–	–	–	–	–
Sphaerium sp.	–	0.0431	0.0128	–	–	–	0.0208	0.0176	0.0352	0.0048	0.0048
Mollusca-Gastropoda											
Gastropoda sp. A	–	–	–	–	–	–	–	–	–	0.0006	–
Gyraulus sp.	–	–	–	–	–	0.0006	–	–	–	–	–
Laevipex sp.	–	–	–	0.0024	–	–	0.0011	0.0006	–	–	–
Physa sp.	–	–	–	–	–	0.0166	–	–	–	–	–
Viviparus sp.	–	0.0504	–	–	–	–	–	0.0138	–	–	–
Arthropoda-Crustacea											
Crangonyx sp.	–	–	–	–	–	–	–	0.0043	–	–	–
Hyalella azteca	–	–	–	–	–	–	–	0.0325	–	–	–
Arthropoda-Insecta-Chironomidae											
Ablabesmyia mallochi	–	–	–	0.0007	–	–	0.0007	–	–	–	–
Chironomus sp.	–	–	–	–	0.0015	–	–	–	–	–	0.0285
Cladotanytarsus sp.	–	–	–	0.0298	0.0002	–	0.0168	0.0002	0.0004	–	–
Conchapelopia sp.	–	–	–	–	–	–	–	–	–	–	0.0014
Corynoneura celeripes	–	–	–	–	–	–	–	–	0.0005	–	–
Corynoneura taris	–	0.0002	0.0043	–	0.0004	–	–	–	–	–	–
Near corynoneura sp.	–	0.0028	0.0029	–	–	–	–	–	–	–	–
Cricotopus sp.	–	0.0003	0.0003	0.0115	0.0020	0.0013	0.0056	0.0242	0.0039	0.0003	0.0003
Cryptochironomus fulvus	–	–	–	0.2723	0.0019	–	0.0525	0.0011	0.0421	–	0.0050

Table F-6. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 9 of 12)

Taxonomic Classification	Stations 1	2	3	4	5	6	7	8	9	10	11
Cryptochironomus sp.	–	–	–	0.0218	–	–	0.0019	–	0.0031	–	–
Cryptotendipes sp.	–	–	–	0.0010	–	–	0.0007	–	0.0004	–	–
Demicryptochironomus sp.	–	–	–	0.0011	–	–	–	–	–	–	–
Dicrotendipes leucoscelis	–	–	–	–	–	–	–	0.0026	–	–	–
Dicrotendipes neomodestus	–	–	–	0.5712	0.0140	–	0.0333	–	–	0.0026	
Dicrotendipes sp.	–	–	–	–	–	–	–	0.0026	–	–	–
Microtendipes sp.	–	–	–	–	–	–	0.1864	–	–	–	–
Nanocladius sp.	–	–	–	–	–	–	0.0005	–	–	–	–
Natarsia sp.	–	–	–	–	–	–	–	–	–	–	0.0010
Nilotanypus sp.	–	–	0.0040	–	0.0047	–	0.0027	–	–	–	–
Parakiefferiella sp.	–	–	–	–	–	–	0.0010	–	0.0002	–	0.0048
Paratendipes sp.	–	–	–	0.0009	–	–	–	–	0.0002	–	–
Phaenopsectra sp.	–	–	–	0.0023	0.0017	–	0.0023	0.0006	–	–	–
Polypedilum convictum	–	–	–	0.0328	–	–	0.1861	–	0.0248	–	–
Polypedilum fallax group	–	0.0010	–	–	–	–	–	–	–	–	–
Polypedilum halterale	–	–	–	0.0107	0.0023	–	–	0.0006	–	–	–
Polypedilum illinoense	–	–	–	–	–	–	–	–	–	–	0.0006
Polypedilum scalaenum	–	–	–	0.2071	0.0034	0.0027	0.0080	0.0006	0.0101	–	0.0628
Potthastia longimanus	–	–	–	–	–	–	0.0010	–	–	–	–
Procladius sp.	–	–	–	0.0047	–	–	–	–	–	–	0.0007
Psectrotanypus dyari	–	–	–	–	–	–	–	–	–	–	0.0302
Rheocricotopus sp.	–	–	–	–	0.0003	–	–	–	0.0047	–	–
Rheotanytarsus exiguus group	–	–	–	–	–	–	0.0036	–	0.0069	–	–
Robackia demeijerea	–	0.0025	0.0088	–	0.0248	0.0009	0.0016	0.0006	0.0182	0.0002	0.0002
Stenochironomus sp.	–	–	–	0.0027	–	–	–	–	–	–	–
Tanytarsus guerlus group	–	–	–	0.0421	0.0004	–	0.0044	–	0.0308	–	–

Table F-6. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 10 of 12)

Taxonomic Classification	Stations 1	2	3	4	5	6	7	8	9	10	11
Thienemanniella xena	–	–	–	0.0010	–	–	–	–	0.0006	–	–
Tribelos fuscicornis	–	–	–	–	–	–	–	–	0.0035	–	–
Tribelos jucundus	–	–	–	–	–	–	–	0.0021	–	–	–
Arthropoda-Insecta-Ephemeroptera											
Ameletus sp.	–	–	–	–	–	–	–	–	0.0080	–	–
Near Baetisca sp.	–	–	–	–	–	–	–	–	0.0007	–	–
Caenis sp.	–	–	–	0.0026	–	–	–	–	–	–	–
Ephemera sp.	–	–	–	–	–	–	–	–	0.0005	–	–
Ephemerella (Serratella) sp.	–	–	–	–	–	0.0067	–	–	–	–	–
Stenonema sp.	–	–	–	0.1051	–	–	–	–	0.0197	–	–
Tricorythodes sp.	–	–	–	0.0031	–	–	0.0031	–	–	–	–
Arthropoda-Insecta-Trichoptera											
Cheumatopsyche sp.	–	–	–	–	0.0031	–	0.0115	–	0.0533	–	–
Glossosomatidae	–	–	–	0.0003	–	–	–	–	–	–	–
Hydropsyche sp.	–	–	–	0.0341	–	–	–	–	–	–	0.0128
Hydroptila sp.	–	–	–	0.0183	–	0.0042	0.0067	–	–	–	–
Hydroptilidae	–	–	–	–	–	–	–	–	–	0.0025	–
Oecetis sp.	–	–	–	0.0021	–	–	0.0443	–	0.0008	–	–
Unidentified Hydropsychidae	–	–	–	0.0341	–	–	0.1364	–	0.0469	–	–
Unidentified Trichoptera	–	–	–	–	0.0008	–	–	–	–	–	–
Arthropoda-Insecta-Miscellaneous											
Antocha sp.	–	–	–	0.0006	–	–	–	–	–	–	–
Ceratopogonidae (no larval key)	–	–	–	0.0007	0.0038	0.0046	0.0019	0.0012	–	–	0.0019
Chaoborus sp.	–	–	0.0010	–	–	–	–	–	–	–	0.0722

Table F-6. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 11 of 12)

Taxonomic Classification	Stations										
	1	2	3	4	5	6	7	8	9	10	11
Coleoptera	–	–	–	0.0060	–	–	0.0060	–	–	–	–
Collembola	–	0.0003	0.0005	0.0005	0.0036	–	–	–	–	0.0003	–
Crenitis sp.	–	–	–	–	–	–	–	–	–	–	0.0883
Ectopria sp.	–	–	–	–	–	–	–	–	–	–	0.0006
Empididae (no larval key)	–	–	–	–	–	–	0.0010	–	0.0031	–	–
Gomphidae	–	–	–	–	0.0799	–	–	–	–	–	–
Gomphus sp.	–	–	–	0.1332	–	–	0.0799	0.0799	–	–	–
Hexatoma sp.	–	–	–	–	–	–	–	–	–	–	0.0009
Isotomurus palustris	–	–	–	–	0.0012	–	–	–	–	–	–
Lanthus sp.	–	–	–	–	–	–	0.0029	–	–	–	–
Limnius latiusculus	–	–	–	0.0002	–	–	–	–	–	–	–
Optioservus sp.	–	–	–	–	–	–	0.0002	–	–	–	–
Pilaria sp.	–	–	–	–	–	–	–	–	–	–	0.0070
Progomphus obscurus	–	–	–	–	–	–	0.0917	–	–	–	0.0274
Protoplasa fitchii	–	–	–	–	–	–	0.0163	–	0.0436	–	–
Rhagovelia sp.	–	–	–	–	–	–	–	–	0.0057	–	–
Simulium sp.	–	–	–	–	–	–	–	–	–	–	0.0021
Stenelmis sp.	–	–	–	–	–	–	0.0006	–	–	–	–
Tipulidae	–	–	–	0.0013	–	–	–	–	0.0013	–	–
Tipula sp.	–	–	–	–	0.0021	–	–	–	–	–	–
Platyhelminthes-Turbellaria											
Planariidae	–	–	–	0.0022	–	–	–	0.0082	–	–	–
Rhabdocoela	0.0423	0.1013	0.1365	0.0013	0.0569	0.0415	0.0183	0.0029	0.0021	0.0029	–

Table F-6. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Benthic Macroinvertebrate Biomass—Collected 7/13-15/81
Blot-dry Wet Weights in Grams Per Square Meter (Continued, Page 12 of 12)

Taxonomic Classification	Stations 1	2	3	4	5	6	7	8	9	10	11
Miscellaneous Invertebrates											
Hydracarina	–	–	0.0008	0.0023	–	–	0.0062	0.0031	0.0037	–	–
Nemata	–	–	0.0006	–	–	0.0011	0.0011	0.0022	0.0009	0.0002	0.0006
Neuroptera	–	0.0009	–	–	–	–	–	–	–	–	–
Podura aquatica	–	–	–	–	–	–	–	–	0.0003	–	–
Prostoma rubrum	–	–	0.0006	0.0016	0.0016	–	0.0016	0.0006	0.0070	..	–
TOTAL WEIGHTS	0.0436	2.4069	15.0175	2.4527	2.9824	1.3560	3.8295	3.7220	4.1932	0.1931	4.5943

Source: WAR, 1981.

APPENDIX G

TISSUE SAMPLE DATA

LIST OF APPENDIX G TABLES

Table G-1. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Insect Larvae Tissue Data—Collected April 11 through May 10, 1981

Parameter (Units)	Station: / Species:* / Date:	2A H. sp. 5/10/81	2B H. sp. 5/10/81	4A C. c. 4/12/81	4B C. c. 4/12/81	6A H. sp. 5/10/81	6B H. sp. 5/10/81	7A C. c. 4/11/81	7B C. c. 4/11/81	8A H. sp. 5/10/81	8B H. sp. 5/10/81
Heavy Metals											
Arsenic (mg As/kg wet wt)		<1.20	<0.50	<0.57	I.S.V.	<0.50	1.70	I.S.V.	I.S.V.	<0.60	I.S.V.
Cadmium (mg Cd/kg wet wt)		<0.05	<0.05	<0.05		<0.05	<0.05			<0.05	
Chromium (mg Cr/kg wet wt)		Inac.	<0.50	Inac.		Inac.	18.00			Inac.	
Lead (mg Pb/kg wet wt)		Inac.	0.28	Inac.		Inac.	0.51			Inac.	
Mercury (mg Hg/kg wet wt)		0.880	0.010	0.240		0.320	0.290			0.240	
Selenium (mg Se/kg wet wt)		<1.20	<0.50	<0.57		<0.50	<0.50			<0.60	
Zinc (mg Zn/kg wet wt)		22.0	26.0	43.0		25.0	20.0			32.0	
Chlorinated Hydrocarbon Pesticides											
BHC-Alpha Isomer (ug/kg wet wt)		3.0		<1.0		7.0		<1.0		<1.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Chlordane (ug/kg wet wt)		<1.0		34.0		<1.0		<1.0		<1.0	
O'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
O'P' DDE (ug/kg wet wt)		†		<1.0		†		<1.0		†	
P'P' DDE (ug/kg wet wt)		10.0		27.0		46.0		42.0		33.0	
O'P' DDT (ug/kg wet wt)		†		<1.0		†		<1.0		†	
P'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Dieldrin (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Heptachlor (ug/kg wet wt)		4.0		<1.0		10.0		2.0		9.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		<10.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<25	
PCB-Aroclor 1254 (ug/kg wet wt)		64		<25		170		<25		150	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25	

* H. sp. = Hydropsyche sp. (caddisfly); C. c. = Corydalus cornutus (heligrammite).
† Could be present but masked by PCBs.

Table G-1. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Insect Larvae Tissue Data—Collected July 18 and 19, 1981 (Continued, Page 2 of 2)

Parameter (Units)	Station:	2A	2B	4A	4B	7A	7B	8A	8B	8A	8B
	Species:*	H. sp.	H. sp.	C. c.	C. c.	C. c.	C. c.	H. sp.	H. sp.	T. sp.	T. sp.
	Date:	7/18/81	7/18/81	7/18/81	7/18/81	7/18/81	7/18/81	7/19/81	7/19/81	7/19/81	7/19/81
Heavy Metals											
Arsenic (mg As/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.54	<0.50	I.S.V.
Cadmium (mg Cd/kg wet wt)		<0.05	<0.05	<0.05	<0.05	0.18	0.06	0.06	<0.05	<0.05	
Chromium (mg Cr/kg wet wt)		0.62	3.00	<0.50	<0.50	<0.50	1.40	<0.50	7.50	<0.50	
Lead (mg Pb/kg wet wt)		<0.05	0.07	0.08	0.41	0.20	0.15	2.80	0.73	0.46	
Mercury (mg Hg/kg wet wt)		<0.006	0.014	0.006	0.041	<0.006	0.030	0.010	0.120	0.007	
Selenium (mg Se/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Zinc (mg Zn/kg wet wt)		26.0	25.0	22.0	27.0	29.0	30.0	41.0	15.0	11.0	
Chlorinated Hydrocarbon Pesticides											
BHC-Alpha Isomer (ug/kg wet wt)		6.0		<1.0		<1.0		16.0		<6.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Chlordane (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
O'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
O'P' DDE (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDE (ug/kg wet wt)		13.0		6.0		28.0		32.0		9.0	
O'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		†		†	
P'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Dieldrin (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Heptachlor (ug/kg wet wt)		4.0		<1.0		<1.0		6.0		5.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		<10.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<25	
PCB-Aroclor 1254 (ug/kg wet wt)		61		<25		<25		110		62	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25	

* H. sp. = Hydropsyche sp. (caddisfly); C. c. = Corydalus cornutus (hellgrammite); T. sp. = Tipula sp. (cranefly).
† Could be present but masked by PCBs.

Source: WAR, 1981.

Table G-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Crayfish Tissue Data—Collected April 11 through May 10, 1981

Parameter (Units)	Station:	2A	2B	4A	4B	6A	6B	7A	7B	8A	8B
	Species:*	cf.	cf.	P. r.	P. r.	cf.	cf.	P. r.	P. r.	cf.	cf.
	Date:	4/11/81	4/11/81	5/10/81	5/10/81	4/11/81	4/11/81	5/08/81	5/08/81	4/11/81	4/11/81
Heavy Metals											
Arsenic (mg As/kg wet wt)		<0.50	I.S.V.†	A.W.S.**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (mg Cd/kg wet wt)		3.70			<0.05	3.60	3.70	<0.05	<0.05	2.70	3.60
Chromium (mg Cr/kg wet wt)		3.10			1.70	1.80	<1.60	Inac.	0.86	<1.50	<1.50
Lead (mg Pb/kg wet wt)		<6.80			0.50	<6.00	<6.60	Inac.	2.30	<6.00	<5.90
Mercury (mg Hg/kg wet wt)		0.020			0.050	0.030	0.050	0.110	<0.006	0.070	0.050
Selenium (mg Se/kg wet wt)		<0.68			<0.50	<0.60	<0.66	<0.50	<0.50	<0.60	<0.59
Zinc (mg Zn/kg wet wt)		25.0			34.0	51.0	43.0	220.0	130.0	37.0	36.0
Chlorinated Hydrocarbon Pesticides											
BHC-Alpha Isomer (ug/kg wet wt)		<1.0		3.0		<1.0		<1.0		<1.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		<1.0		1.0		<1.0		<1.0		<1.0	
Chlordane (ug/kg wet wt)		<1.0		21.0		<1.0		<1.0		<1.0	
O'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
O'P' DDE (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDE (ug/kg wet wt)		<1.0		2.0		<1.0		<1.0		<1.0	
O'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		11.0		<1.0	
P'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Dieldrin (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Heptachlor (ug/kg wet wt)		<1.0		7.0		<1.0		<1.0		<1.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		<10.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<25	
PCB-Aroclor 1254 (ug/kg wet wt)		<25		<25		<25		<25		<25	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25	

* cf. = Crayfish (may be mixture but probably Cambarus bartonii); P. r. = Procambarus raneyi.
† I.S.V. = Insufficient volume.
** A.W.S. = Analyzed wrong species.

Table G-2. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Crayfish Tissue Data—Collected July 31 through August 2, 1981 (Continued, Page 2 of 2)

Parameter (Units)	Station: Species:* Date:	2A P. r. 7/31/81	2B P. r. 7/31/81	2A C. b. 7/31/81	2B C. b. 7/31/81	4A P. r. 8/02/81	4B P. r. 8/02/81	6A C. b. 8/01/81	6B C. b. 8/01/81	7A P. r. 8/01/81	7B P. r. 8/01/81	8A C. b 8/01/81	8B C. b. 8/01/81
Heavy Metals													
Arsenic (mg As/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	1.20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (mg Cd/kg wet wt)		<0.05	<0.05	0.26	0.06	0.15	<0.05	0.17	<0.05	0.12	0.15	0.17	0.07
Chromium (mg Cr/kg wet wt)		0.93	0.74	0.64	<0.50	<0.50	0.71	<0.50	1.90	0.90	0.66	1.40	3.20
Lead (mg Pb/kg wet wt)		3.50	0.84	0.55	0.14	15.00	2.40	3.30	0.76	6.40	4.10	0.28	0.73
Mercury (mg Hg/kg wet wt)		<0.006	0.009	<0.006	0.083	0.012	0.086	0.029	0.023	<0.006	0.063	0.024	0.120
Selenium (mg Se/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Zinc (mg Zn/kg wet wt)		51.0	48.0	26.0	30.0	160.0	150.0	50.0	47.0	120.0	110.0	39.0	54.0
Chlorinated Hydrocarbon Pesticides													
BHC-Alpha Isomer (ug/kg wet wt)		2.0		2.0		<1.0		<1.0		<1.0		<1.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		<1.0		<1.0		<1.0		1.0		<1.0		<1.0	
Chlordane (ug/kg wet wt)		24.0		12.0		7.0		15.0		4.0		<1.0	
O'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		18.0		4.0		<1.0	
O'P' DDE (ug/kg wet wt)		†		<1.0		†		†		<1.0		†	
P'P' DDE (ug/kg wet wt)		13.0		16.0		6.0		20.0		14.0		12.0	
O'P' DDT (ug/kg wet wt)		†		<1.0		†		†		<1.0		†	
P'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Dieldrin (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Heptachlor (ug/kg wet wt)		6.0		3.0		2.0		3.0		1.0		3.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		<10.0		<10.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10		<10	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<25		<25	
PCB-Aroclor 1254 (ug/kg wet wt)		84		<25		<25		83		<25		130	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25		<25	

* P. r. = Procambarus raneyi; C. b. = Cambarus bartonii.
† Could be present but masked by PCBs.

Source: WAR, 1981.

Table G-3. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Surface Fish Tissue Data—Collected May 8 through 10, 1981

Parameter (Units)	Station:* / Species:† / Date:	2A / M. c. / 5/10/81	2B / M. c. / 5/10/81	4A / L. a. / 5/08/81	4B / L. a. / 5/80/81	G.S. / L. a. / 5/09/81	G.S. / L. a. / 5/09/81	7A / L. a. / 5/08/81	7B / L. a. / 5/08/81	10A / L. m. / 5/10/81	10B / L. m. / 5/10/81
Heavy Metals											
Arsenic (mg As/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	—	<0.50	<0.50	1.80
Cadmium (mg Cd/kg wet wt)		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	—	<0.05	<0.05	<0.05
Chromium (mg Cr/kg wet wt)		Inac.	<0.50	Inac.	0.70	Inac.	<0.50	Inac.	1.40	—	1.50
Lead (mg Pb/kg wet wt)		Inac.	0.54	Inac.	0.21	Inac.	0.06	Inac.	<0.05	—	0.28
Mercury (mg Hg/kg wet wt)		0.130	0.130	0.040	0.042	0.130	0.025	—	<0.006	0.044	0.006
Selenium (mg Se/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	—	<0.50	<0.50	<0.50
Zinc (mg Zn/kg wet wt)		9.3	23.0	6.1	5.4	6.1	6.5	6.0	4.8	6.7	14.0
Chlorinated Hydrocarbon Pesticides											
BHC-Alpha Isomer (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Chlordane (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
O'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
O'P' DDE (ug/kg wet wt)		**		<1.0		**		**		**	
P'P' DDE (ug/kg wet wt)		100.0		5.0		12.0		28.0		17.0	
O'P' DDT (ug/kg wet wt)		**		<1.0		<1.0		<1.0		<1.0	
P'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Dieldrin (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Heptachlor (ug/kg wet wt)		4.0		<1.0		<1.0		3.0		<1.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		1.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10.0	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<10	
PCB-Aroclor 1254 (ug/kg wet wt)		140		<25		<25		80		<25	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25	

* G.S. = Gregg Shoals.
† M. c. = Morone chrysops (white bass); L. a. = Lepomis auritus (redbreast sunfish); L. m. = Lepomis macrochirus (bluegill).
** Could be present but masked by PCBs.

Table G-3. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Surface Fish Tissue Data—Collected July 31 and August 1, 1981 (Continued, Page 2 of 2)

Parameter (Units)	Station:*	2A	2B	4A	4B	4A	4B	G.S.	G.S.	7A	7B	10A	10B
	Species:†	M. c.	M. c.	L. m.	L. m.	L. a.	L. a.	L. a.	L. a.	L. a.	L. a.	L. m.	L. m.
	Date:	8/01/81	8/01/81	7/31/81	7/31/81	7/31/81	7/31/81	8/01/81	8/01/81	7/31/81	7/31/81	8/01/81	8/01/81
Heavy Metals													
Arsenic (mg As/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (mg Cd/kg wet wt)		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (mg Cr/kg wet wt)		<0.50	1.00	<0.50	2.00	<0.50	2.60	<0.50	0.92	<0.50	<0.50	<0.50	1.90
Lead (mg Pb/kg wet wt)		<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	0.06	<0.05	0.22	<0.05	<0.05
Mercury (mg Hg/kg wet wt)		0.018	0.029	0.014	0.059	<0.006	<0.006	<0.006	0.053	0.017	0.019	<0.006	0.051
Selenium (mg Se/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Zinc (mg Zn/kg wet wt)		3.8	3.3	5.3	5.3	5.7	11.0	4.7	5.7	4.2	5.3	6.8	5.9
Chlorinated Hydrocarbon Pesticides													
BHC-Alpha Isomer (ug/kg wet wt)		3.0		1.0		<1.0		2.0		<1.0		3.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		2.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Chlordane (ug/kg wet wt)		27.0		12.0		9.0		6.0		20.0		10.0	
O'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDD (ug/kg wet wt)		25.0		6.0		<1.0		8.0		6.0		7.0	
O'P' DDE (ug/kg wet wt)		**		**		<1.0		**		12.0		**	
P'P' DDE (ug/kg wet wt)		70.0		27.0		5.0		70.0		22.0		37.0	
O'P' DDT (ug/kg wet wt)		**		<1.0		<1.0		**		<1.0		**	
P'P' DDT (ug/kg wet wt)		<1.0		<1.0		<1.0		11.0		<1.0		8.0	
Dieldrin (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
Heptachlor (ug/kg wet wt)		11.0		2.0		<1.0		3.0		2.0		2.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		<10.0		<10.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10		<10	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<25		<25	
PCB-Aroclor 1254 (ug/kg wet wt)		130		38		<25		52		<25		61	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25		<25	

* G.S. = Gregg Shoals.
† M. c. = *Morone chrysops* (white bass); L. m. = *Lepomis macrochirus* (bluegill); L. a. = *Lepomis auritus* (redbreast sunfish).
** Could be present but masked by PCBs.

Source: WAR, 1981.

Table G-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Bottom Fish Tissue Data—Collected April 10 through May 10, 1981

Parameter (Units)	Station: / Species:* / Date:	2A M. a. 5/10/81	2B M. a. 5/10/81	4A M. a. 4/10/81	4B M. a. 4/10/81	6A M. a. 4/12/81	6B M. a. 4/12/81	7A M. a. 5/07/81	7B M. a. 5/07/81	8A M. a. 4/12/81	8B M. a. 4/12/81
Heavy Metals											
Arsenic (mg As/kg wet wt)		<0.50	0.79	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (mg Cd/kg wet wt)		<0.05	<0.05	1.90	2.30	2.00	<1.30	<0.05	<0.05	2.20	2.60
Chromium (mg Cr/kg wet wt)		Inac.	<0.50	<1.10	<1.10	<1.10	<1.10	Inac.	0.77	1.30	<1.20
Lead (mg Pb/kg wet wt)		Inac.	0.11	<4.40	<4.40	<4.30	<4.40	Inac.	0.07	<5.00	<4.80
Mercury (mg Hg/kg wet wt)		0.039	<0.006	0.330	0.320	0.280	0.330	0.054	<0.006	0.250	0.210
Selenium (mg Se/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	—
Zinc (mg Zn/kg wet wt)		4.7	1.4	3.1	2.8	2.3	2.4	3.9	3.6	2.9	1.6
Chlorinated Hydrocarbon Pesticides											
BHC-Alpha Isomer (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		2.0		<1.0		<1.0		<1.0		<1.0	
Chlordane (ug/kg wet wt)		†		†		†		<1.0		†	
O'P' DDD (ug/kg wet wt)		†		†		†		<1.0		†	
P'P' DDD (ug/kg wet wt)		74.0		†		†		<1.0		†	
O'P' DDE (ug/kg wet wt)		†		†		†		†		†	
P'P' DDE (ug/kg wet wt)		480.0		†		†		130.0		†	
O'P' DDT (ug/kg wet wt)		†		†		†		†		†	
P'P' DDT (ug/kg wet wt)		†		†		†		<1.0		†	
Dieldrin (ug/kg wet wt)		<1.0		†		†		<1.0		†	
Heptachlor (ug/kg wet wt)		7.0		<1.0		<1.0		5.0		<1.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		<10.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<25	
PCB-Aroclor 1254 (ug/kg wet wt)		570		2400		1400		260		1600	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25	

* M. a. = Moxostoma anisurum (silver redhorse sucker).
† Could be present but masked by PCBs.

Table G-4. Richard B. Russell Preimpoundment Study—Contract No. DACW21-81-C-0029
Bottom Fish Tissue Data—Collected August 1 and 2, 1981 (Continued, Page 2 of 2)

Parameter (Units)	Station:	2A	2B	4A	4B	6A	6B	7A	7B	8A	8B
	Species:*	M. a.	M. a.	I. b.	I. b.	M. a.	M. a.	I. b.	I. b.	M. a.	M. a.
	Date:	8/01/81	8/01/81	8/01/81	8/01/81	8/02/81	8/02/81	8/02/81	8/02/81	8/01/81	8/01/81
Heavy Metals											
Arsenic (mg As/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (mg Cd/kg wet wt)		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (mg Cr/kg wet wt)		<0.50	1.20	<0.50	2.10	<0.50	1.60	<0.50	<0.50	<0.50	2.70
Lead (mg Pb/kg wet wt)		<0.05	<0.05	<0.05	0.07	<0.05	0.13	0.06	<0.05	<0.05	0.08
Mercury (mg Hg/kg wet wt)		0.006	<0.006	0.021	<0.006	0.031	0.150	<0.006	<0.006	<0.006	0.160
Selenium (mg Se/kg wet wt)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Zinc (mg Zn/kg wet wt)		3.3	2.9	8.7	9.4	3.5	9.9	4.6	3.8	4.2	3.8
Chlorinated Hydrocarbon Pesticides											
BHC-Alpha Isomer (ug/kg wet wt)		2.0		1.0		6.0		<1.0		22.0	
BHC-Beta Isomer (ug/kg/wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
BHC-Gamma Isomer (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		2.0	
Chlordane (ug/kg wet wt)		13.0		7.0		52.0		5.0		150.0	
O'P' DDD (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
P'P' DDD (ug/kg wet wt)		16.0		4.0		48.0		6.0		170.0	
O'P' DDE (ug/kg wet wt)		†		<1.0		†		5.0		†	
P'P' DDE (ug/kg wet wt)		75.0		5.0		320.0		41.0		910.0	
O'P' DDT (ug/kg wet wt)		†		<1.0		†		<1.0		†	
P'P' DDT (ug/kg wet wt)		<1.0		<1.0		140.0		<1.0		400.0	
Dieldrin (ug/kg wet wt)		<1.0		<1.0		<1.0		<1.0		<1.0	
Heptachlor (ug/kg wet wt)		3.0		<1.0		8.0		<1.0		23.0	
Methoxychlor (ug/kg wet wt)		<10.0		<10.0		<10.0		<10.0		<10.0	
Mirex (ug/kg wet wt)		<10		<10		<10		<10		<10	
PCB-Aroclor 1242 (ug/kg wet wt)		<25		<25		<25		<25		<25	
PCB-Aroclor 1254 (ug/kg wet wt)		110		<25		480		<25		1200	
PCB-Aroclor 1260 (ug/kg wet wt)		<25		<25		<25		<25		<25	
Toxaphene (ug/kg wet wt)		<25		<25		<25		<25		<25	

* M. a. = Moxostoma anisurum (silver redhorse sucker); I. b. = Ictalurus brunneus (green bullhead or snail bullhead).
† Could be present but masked by PCBs.

Source: WAR, 1981.